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Your Open WiMAX Choice

# 4Motion™

# System Manual

**Release 2.0**
**July 2008**
**P/N 215038**

# Document History

| Topic | Description | Date Issued |
|---|---|---|
| Preliminary Release for Early Field Trials | New System Manual | January 2008 |
| Preliminary Release for Beta | | May 2008 |
| Release for GA | | July 2008 |
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## Radio Frequency Interference Statement

The Base Transceiver Station (BTS) equipment has been tested and found to comply with the limits for a class A digital device, pursuant to ETSI EN 301 489-1 rules and Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in commercial, business and industrial environments. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

## FCC Radiation Hazard Warning

To comply with FCC RF exposure requirements in Section 1.1307 and 2.1091 of FCC Rules, the antenna used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meter from all persons.

## R&TTE Compliance Statement

This equipment complies with the appropriate essential requirements of Article 3 of the R&TTE Directive 1999/5/EC.

## Safety Considerations - General

For the following safety considerations, "Instrument" means the BreezeMAX units' components and their cables.

## Grounding

BTS chassis, Power Feeders and Outdoor Units are required to be bonded to protective grounding using the bonding stud or screw provided with each unit.

## Safety Considerations - DC Powered Equipment (BTS & Power Feeder)

| CAUTION | ATTENTION |
|---|---|
| Risk of electric shock and energy hazard.Disconnecting one Power Interface Unit (PIU) disconnects only one PIU module. To isolate the BTS completely, disconnect both PIUs | Risque de décharge électrique et d'electrocution. La déconnection d'un seul module d'alimentation (PIU) n'isole pas complètement la Station de Base. Pour cela, il faut impérativement débrancher les deux modules d'alimentation (PIU). |

**Restricted Access Area**: The DC powered equipment should only be installed in a Restricted Access Area.

**Installation Codes**: The equipment must be installed according to the latest edition of the country national electrical codes. For North America, equipment must be installed in accordance with the US National Electrical Code and the Canadian Electrical Code.

**Overcurrent Protection**: A readily accessible Listed branch circuit overcurrent protective device, rated 60A for the BTS or 20A for the Power Feeder, must be incorporated in the building wiring.

**CAUTION**: This equipment is designed to permit connection between the earthed conductor of the DC supply circuit and the grounding conductor at the equipment. See installation instructions.

- The equipment must be connected directly to the DC Supply System grounding electrode conductor.
- All equipment in the immediate vicinity must be grounded in the same way, and not be grounded elsewhere.
- The DC supply system is to be local, i.e. within the same premises as the equipment.
- There shall be no disconnect device between the grounded circuit conductor of the DC source (return) and the point of connection of the grounding electrode conductor.

### Lithium Battery

The battery on the NPU card is not intended for replacement.

### Caution

To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

### Line Voltage

Before connecting this instrument to the power line, make sure that the voltage of the power source matches the requirements of the instrument.

### Radio

The instrument transmits radio energy during normal operation. To avoid possible harmful exposure to this energy, do not stand or work for extended periods of time in front of its antenna. The long-term characteristics or the possible physiological effects of radio frequency electromagnetic fields have not been yet fully investigated.

### Outdoor Units and Antennas Installation and Grounding

Ensure that outdoor units, antennas and supporting structures are properly installed to eliminate any physical hazard to either people or property. Make sure that the installation of the outdoor unit, antenna and cables is performed in accordance with all relevant national and local building and safety codes. Even where grounding is not mandatory according to applicable regulation and national codes, it is highly recommended to ensure that the outdoor unit and the antenna mast (when using external antenna) are grounded and suitable lightning protection devices are used so as to provide protection against voltage surges and static charges. In any event, Alvarion is not liable for any injury, damage or

regulation violations associated with or caused by installation, grounding or lightning protection.

## Disposal of Electronic and Electrical Waste

**Disposal of Electronic and Electrical Waste**

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damage and/or bodily harm and/or void the user's authority to operate the equipment and/or revoke the warranty provided by such manufacturer.

# About This Manual

This manual describes the 4Motion solution, and details how to install, operate and manage the BTS system components.

This manual is intended for technicians responsible for installing, setting and operating the 4Motion BTS equipment, and for system administrators responsible for managing the system.

This manual contains the following chapters and appendices:

- **Chapter 1 - System description:** Describes the 4Motion BTS and its components.
- **Chapter 2 - Installation:** Describes how to install the BTS components.
- **Chapter 3 - Commissioning:** Describes how to configure basic parameters and validate units' operation.
- **Chapter 4 - Operation and Administration Using the CLI:** Describes how to use the Command Line Interface (CLI) for configuring parameters, checking system status and monitoring performance.
- **Appendix A - Antenna Configurations: Describes** the proposed antenna configurations that support the different available diversity scenarios.
- **Appendix B - Software Upgrade:** Describes how to load new software files using TFTP, and how to switch to a new software version in 4Motion units.
- **Glossary:** A listing of commonly used terms.

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# Chapter 1 - System Description

## In This Chapter:


- "About WiMAX" on page 2
- "4MotionTM Solution" on page 3
- "The Base Transceiver Station" on page 12
- "Element Management Systems" on page 22
- "Specifications" on page 24

# 1.1 About WiMAX

Emanating from the broadband world and using all-IP architecture, mobile WiMAX is the leading technology for implementing personal broadband services. With huge market potential and affordable deployment costs, mobile WiMAX is on the verge of a major breakthrough. No other technology offers a full set of chargeable and differentiated voice, data, and premium video services in a variety of wireless fashions - fixed, portable and mobile - that increase revenue and reduce subscriber churn.

WiMAX technology is the solution for many types of high-bandwidth applications at the same time across long distances and will enable service carriers to converge the all-IP-based network for triple-play services data, voice, and video.

WiMAX with its QoS support, longer reach, and high data capacity is positioned for fixed broadband access applications in rural areas, particularly when distance is too large for DSL and cable, as well as in urban/suburban areas of developing countries. Among applications for residential are high speed Internet, Voice Over IP telephony and streaming video/online gaming with additional applications for enterprise such as Video conferencing, Video surveillance and secured Virtual Private Network (with need for high security). WiMAX technology allows covering applications with media content requesting more bandwidth.

WiMAX allows portable and mobile access applications, with incorporation in notebook computers and PDAs, allowing for urban areas and cities to become “metro zones” for portable and mobile outdoor broadband wireless access. As such WiMAX is the natural complement to 3G networks by offering higher bandwidth and to Wi-Fi networks by offering broadband connectivity in larger areas.

The WiMAX Forum is an organization of leading operators and communications component and equipment companies. The WiMAX Forum’s charter is to promote and certify the compatibility and interoperability of broadband wireless access equipment that conforms to the Institute for Electrical and Electronics Engineers (IEEE) 802.16 and ETSI HiperMAN standards. The ultimate goal of the WiMAX Forum is to accelerate the introduction of cost-effective broadband wireless access services into the marketplace. Standards-based, interoperable solutions enable economies of scale that, in turn, drive price and performance levels unachievable by proprietary approaches, making WiMAX Forum Certified products.

# 1.2 4Motion Solution

## 1.2.1 4Motion Solution Highlights

Leveraging its extensive experience in Broadband Wireless Access (BWA) systems, leading technology and current favorable economics for broadband and mobile services, Alvarion's 4Motion mobile WiMAX solution represents the next evolution in communications.

With 4Motion, Alvarion offers a diversified range of products and services for all operators. Integrating the most advanced and adaptive radio management and control technologies, 4Motion optimizes usage of the operator's spectrum and network resources. At the same time, the solution supports the most stringent quality of service (QoS) requirements for next-generation applications such as video and gaming.

As a mobile solution, 4Motion network can be efficiently integrated with existing networks, including 3G, DSL, satellite, and cable, to provide multiple service applications.

4Motion enables operators and their customers to address the following consumer and enterprise market segments:

- “Best effort" fixed broadband access (DSL equivalent)
- Portable broadband access
- "Personal broadband" (handheld) access
- Mobile broadband (including full handover and roaming support)

4Motion supports the following services:

- IP-based services (e.g. VoIP, video streaming, gaming)
- QoS and application-based prioritization and de-prioritization

4Motion is designed as an end-to-end solution based on the following elements:

- BTS (Base Transceiver Station) equipment with an optional localized access service network gateway (ASN-GW)

- Optional centralized, fully integrated ASN-GW, which may be offered as a part of an end-to-end solution that includes third-party partners' equipment
- AAA servers provided by either Alvarion or its leading WiMAX partners
- AlvariSTAR™ Element management system supporting NMS and OSS systems
- Customer premises equipment and handsets

Figure 1-1 illustrates the entire service provider environment and 4Motion solution elements within the radio access network, core network and subscriber environment.

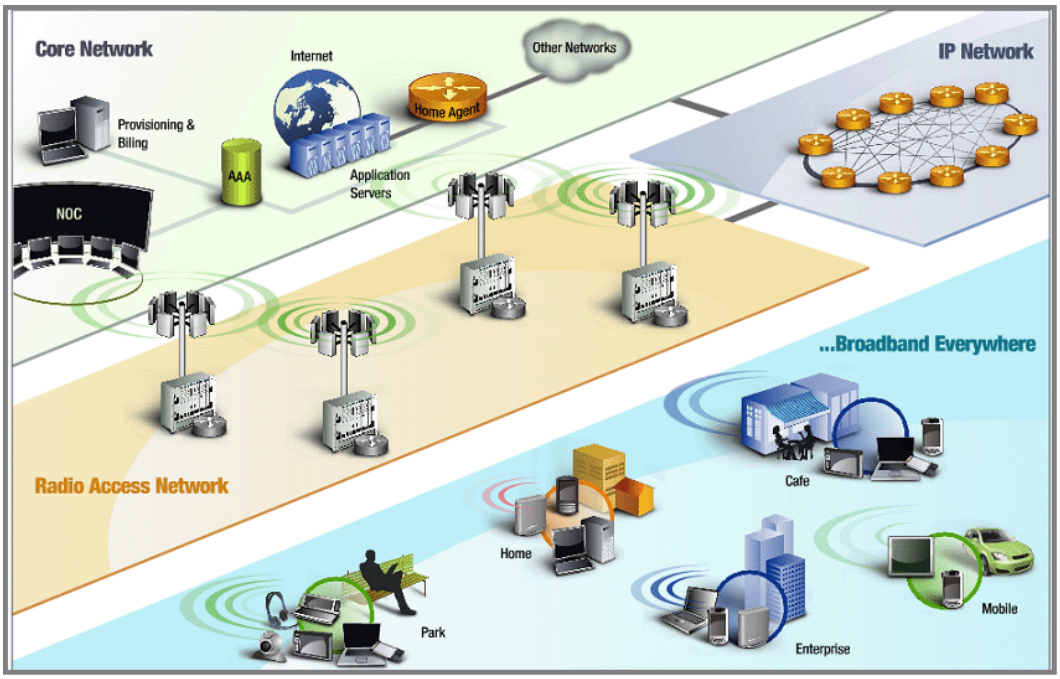



**Figure 1-1: 4Motion Solution Elements**

Alvarion believes that compliance with standard-driven open architecture protects the infrastructure investment, and opens the system to a variety of fully interoperable end-user devices. As such, 4Motion is designed with open architecture and interfaces according to the WiMAX Forum networking working group (NWG) profile C, which supports openness and enables flat as well as hierarchical topologies. In addition, by keeping the radio resource management functionality in the Base Transceiver Station only, Profile C delivers a faster, optimized handover mechanism.

## 1.2.2 WiMAX Network Reference Model

Figure 1-2 and Figure 1-3 show the basic mobile WiMAX network architecture, with a single ASN-GW and with multiple ASN-GWs, as defined by the WiMAX Forum NWG.

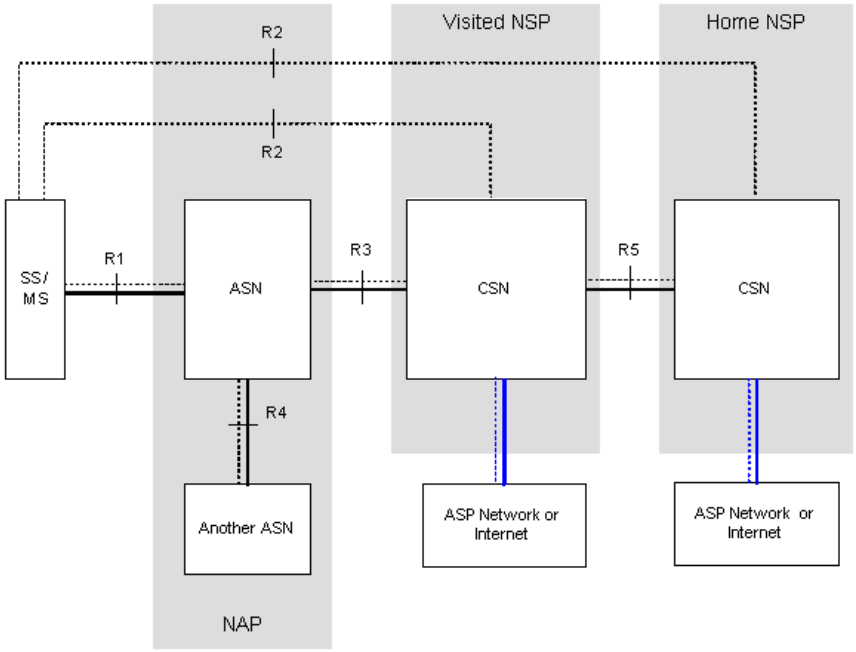



**Figure 1-2: Mobile WiMAX Network Reference Model**

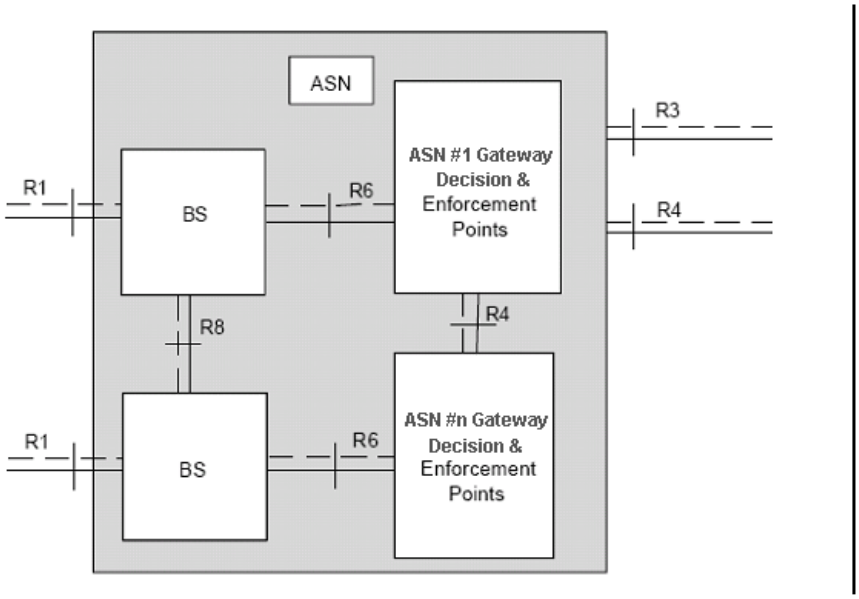



**Figure 1-3: ASN Reference Model containing Multiple ASN-GWs**

The various components and entities involved in the networking architecture are:

### 1.2.2.1 Access Service Network (ASN)

An ASN is defined as a complete set of network functions needed to provide radio access to a WiMAX subscriber. The ASN provides the following mandatory functions:

- WiMAX Layer-2 (L2) connectivity with WiMAX mobile station (MS)
- Transfer of AAA messages to the WiMAX subscriber's home network service provider (H-NSP) for authentication, authorization and session accounting for subscriber sessions
- Network discovery and selection of the WiMAX subscriber's preferred NSP
- Relay functionality for establishing Layer-3 (L3) connectivity with a WiMAX MS (i.e. IP address allocation)
- Radio resource management
- ASN-CSN tunneling
- ASN anchored mobility

An ASN is comprised of network elements such as one or more base transceiver stations and one or more ASN gateways. An ASN may be shared by more than one connectivity service network (CSN).

### 1.2.2.2 Connectivity Service Network (CSN)

A CSN is defined as a set of network functions that provide IP connectivity services to WiMAX subscribers. A CSN may offer the following functions:

- MS IP address and endpoint parameter allocation for user sessions
- Internet access
- AAA proxy or server
- Policy and admission control based on user subscription profiles
- ASN-CSN tunneling support
- WiMAX subscriber billing and inter-operator settlement
- WiMAX services such as location-based services, connectivity for peer-to-peer services, provisioning, authorization and/or connectivity to IP multimedia services, and facilities to support lawful intercept services such as those compliant with Communications Assistance Law Enforcement Act (CALEA) procedures

A CSN is comprised of network elements such as routers, proxy/servers, user databases, and inter-working gateway devices.

### 1.2.2.3 Network Access Provider (NAP)

An NAP is a business entity that provides WiMAX radio access infrastructure to one or more WiMAX network service providers (NSPs). A NAP implements this infrastructure using one or more ASNs.

### 1.2.2.4 Network Service Provider (NSP)

An NSP is a business entity that provides IP connectivity and WiMAX services to WiMAX subscribers compliant with the established service level agreement. The NSP concept is an extension of the Internet service provider (ISP) concept, providing network services beyond Internet access. To provide these services, an NSP establishes contractual agreements with one or more NAPs. An NSP may also establish roaming agreements with other NSPs and contractual agreements with

third-party application providers (e.g. ASP, ISP) for the delivery of WiMAX services to subscribers. From a WiMAX subscriber standpoint, an NSP may be classified as a home or visited NSP.

### 1.2.2.5 Base Station (BS)

The WiMAX BS is an entity that implements the WiMAX MAC and PHY in compliance with the IEEE 802.16e standard. A BS operates on one frequency assignment, and incorporates scheduler functions for uplink and downlink resources.

The basic functionality of the BS includes:

- IEEE 802.16e OFDMA PHY/MAC entity
- R6 and R8 functionality according to NWG definitions
- Extensible Authentication Protocol (EAP) relay
- Control message authentication
- User traffic authentication and encryption
- Handover management
- QoS service flow management entity

### 1.2.2.6 ASN Gateway (ASN-GW)

The ASN-GW is a network entity that acts as a gateway between the ASN and CSN. The ASN functions hosted in an ASN-GW may be viewed as consisting of two groups - the decision point (DP) and enforcement point (EP). The EP includes bearer plane functions, and the DP includes non-bearer plane functions.

The basic DP functionality of the ASN-GW includes:

- Implementation of EAP Authenticator and AAA client
- Termination of RADIUS protocol against the selected CSN AAA server (home or visited AAA server) for MS authentication and per-MS policy profile retrieval
- Storage of the MS policy profile
- Generation of authentication key material

- QoS service flow authorization entity
- AAA accounting client

The basic EP functionality of the ASN-GW includes:

- Classification of downlink data into generic routing encapsulation (GRE) tunnels
- Packet header suppression functionality
- DHCP functionality
- Handover functionality

The WIMAX Forum NWG has adopted two different approaches for ASN architecture - centralized and distributed: In the centralized approach there is at least one central ASN-GW, and the BTS NPU operates in transparent mode, as shown in Figure 1-4.

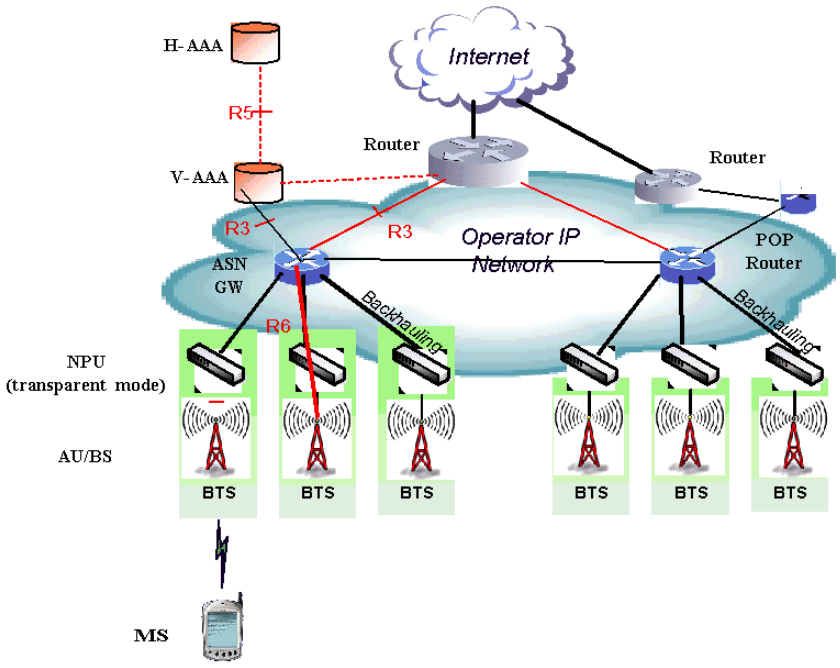



**Figure 1-4: Centralized Network Reference Model**

In the distributed approach, the BTS NPU operates in ASN-GW mode, as shown in Figure 1-5.

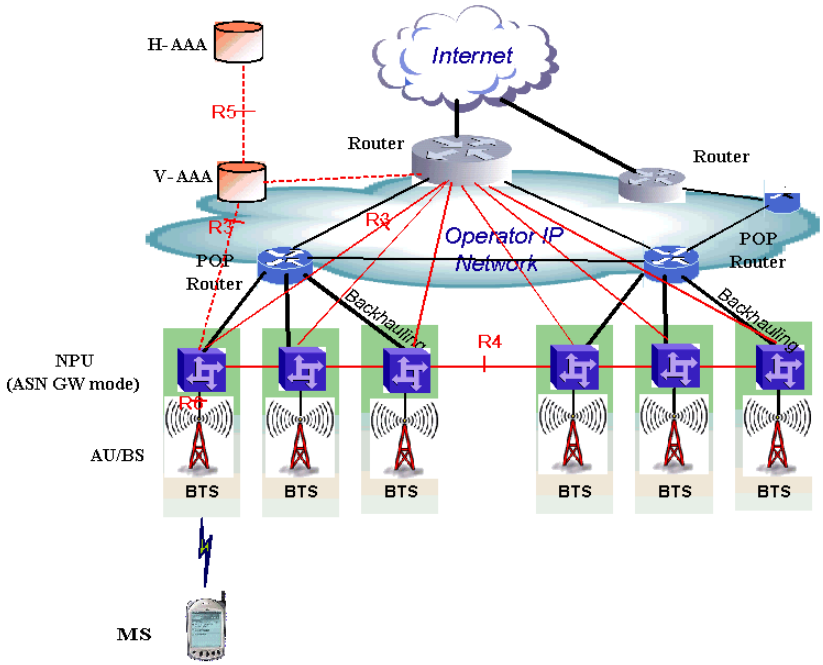



**Figure 1-5: Distributed Network Reference Model**

Alvarion believes in providing operators with the flexibility to select the mobile WiMAX network topology that best suits their needs and existing network architecture. Therefore, 4Motion is designed to support both distributed and centralized topology approaches according to WiMAX Forum NWG profile C.

### 1.2.2.7 Reference Points

- **Reference point R1** consists of the protocols and procedures between the MS and ASN as per the air-interface (PHY and MAC) specifications (IEEE 802.16e).

- **Reference point R2** consists of protocols and procedures between the MS and CSN associated with authentication, services authorization and IP host configuration management. This reference point is logical in that it does not reflect a direct protocol interface between the MS and CSN. The authentication part of reference point R2 runs between the MS and CSN operated by the home NSP, however, the ASN and CSN operated by the visited NSP may partially process the aforementioned procedures and mechanisms. Reference point R2 might support IP host configuration management running between the MS and CSN (operated by either the home NSP or visited NSP).

- **Reference point R3** consists of the set of control plane protocols between the ASN and CSN to support AAA, policy enforcement and mobility management capabilities. It also encompasses the bearer plane methods (e.g. tunneling) to transfer user data between the ASN and CSN.

- **Reference point R4** consists of the set of control and bearer plane protocols originating/terminating in various functional entities of an ASN that coordinate MS mobility between ASNs and ASN-GWs. R4 is the only interoperable reference point between similar or heterogeneous ASNs.

- **Reference point R5** consists of the set of control plane and bearer plane protocols for internetworking between the CSN operated by the home NSP and that operated by a visited NSP.

- **Reference point R6** consists of the set of control and bearer plane protocols for communication between the BS and ASN-GW. The bearer plane consists of an intra-ASN data path between the BS and ASN gateway. The control plane includes protocols for data path establishment, modification and release control in accordance with the MS mobility events.

- **Reference point R8** consists of the set of control plane message flows and optional bearer plane data flows between the base stations to ensure a fast and seamless handover. The bearer plane consists of protocols that allow data transfer between base stations involved in the handover of a certain MS.

It is important to note that all reference points are logical and do not necessarily imply a physical or even direct connection. For instance, the R4 reference point between ASN-GWs might be implemented across the NAP internal transport IP network, in which case R4 traffic might traverse several routers from the source to the destination ASN-GW.

## 1.3 The Base Transceiver Station

The 4Motion solution features a multi-carrier, high-power Base Transceiver Station (BTS). Designed for high availability and redundancy, it utilizes a central networking and management architecture, and a range of diversity schemes.

The BTS main features include:

- R1 support - 802.16e interface handling (e.g. PHY, MAC, CS, Scheduler, ARQ) and processes such as handover, power control and network entry
- R6 support - communication with ASN-GW
- EAP proxy in ASN-GW mode
- Handover triggering for mobility tunnel establishment - R6 (GRE tunnel)
- Local QoS PEP for traffic via air interface (or SFM) and admission control
- Hand-Over (HO) control function
- Radio resource management agent
- Key generation (TEK, KEK) and traffic encryption

The 4Motion Base Transceiver Station includes the modular BreezeMAX shelf, Outdoor Radio Units, GPS Receiver and other components.

### 1.3.1 The BreezeMAX Shelf

The BreezeMAX shelf is an indoor -48 VDC powered 8U cPCI PICMG 2.x standard shelf prepared for installation in a 19" or 21" (ETSI) rack. This chassis has a total of nine double-Euro (6U high) slots and six single-Euro (3U high) slots. All the

modules are hot swappable, and high availability can be provided through multiple redundancy schemes.

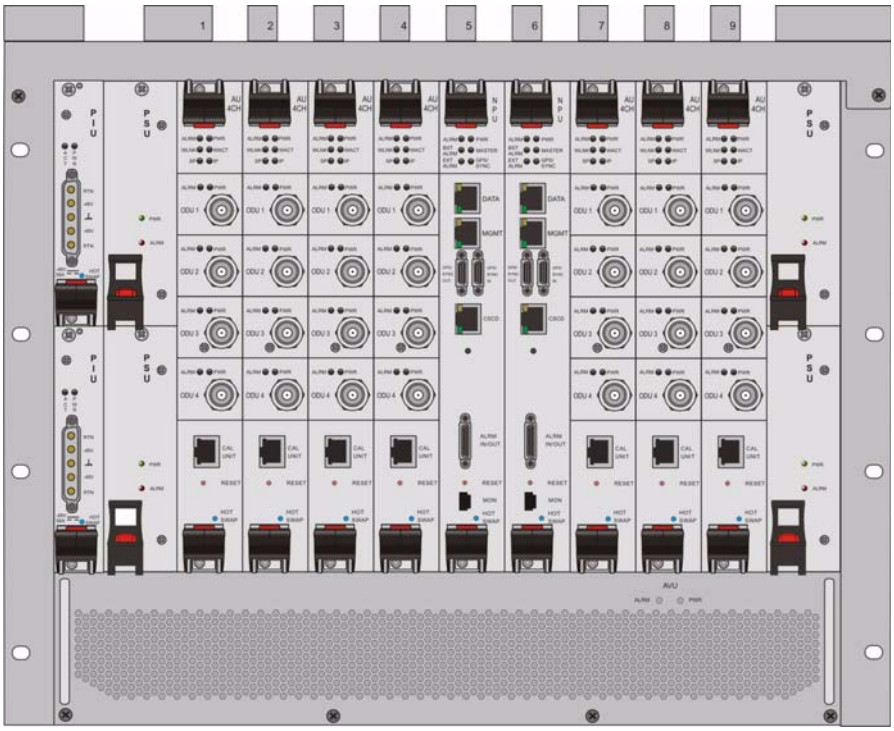


**Figure 1-6: BreezeMAX Shelf (with all modules installed)**

The shelf modules are:

**Table 1-1: BreezeMAX Shelf Modules**

| Module | Description |
|---|---|
| PIU | 3U high power interface unit, 1+1 redundancy, -48 VDC, protection, filters |
| PSU | 3U high power supply unit, up to 3+1 redundancy |
| NPU | 6Uhigh network processing unit with optional ASN-GW functionality, hardware ready for 1+1 redundancy, 1000/100 Base-T main network interface, 1000/100 Base-T cascade interface and 100/10 Base-T out-of-band management interface |
| AU | 6U high access unit, 4-channel, 802.16e MAC-modem-baseband IF card |
| AVU | 2U high air ventilation unit, 9+1 redundancy fans with alarm control |

The six single-Euro slots are intended for one or two redundant Power Interface Units (PIUs) and up to four redundant Power Supply Units (PSUs). One of the double Euro slots is dedicated to the NPU module, with interfaces for network backhaul, in-band and out-of-band (OOB) management connections. Another

double-Euro slot is reserved for an optional redundant NPU (the shelf is HW-ready for NPU redundancy). The remaining seven double-Euro slots are dedicated for Access Unit (AU) modules, thereby enabling various network topologies and future redundancy configurations. In addition, the shelf contains an Air Ventilation Unit (AVU).

### 1.3.2 NPU

The Network Processing Unit is the controller of the Base Transceiver Station. Serving as the central processing unit that manages the BTS components, the NPU aggregates traffic to/from the AU modules, and transfers it to/from the IP backbone through a dedicated Gigabit/Fast Ethernet interface. In addition, the NPU can be operated in ASN-GW mode, in which case it also implements ASN-GW functionality.

When operating in ASN-GW mode, the NPU implements the R3 reference point toward the CSN, R4 reference point toward other ASN-GWs, and R6 reference point toward AU/BSs. The R8 reference point traffic is transparently relayed between AU/BSs (intra- or inter-BTS).

When operating in transparent mode, the NPU transparently relays R6 and R8 reference-point traffic between AU/BSs (intra- or inter-BTS).

The BreezeMAX shelf is hardware-ready for 1+1 NPU card redundancy.

The NPU main functions, when operating in transparent mode, are:

- Aggregate backbone Ethernet connectivity for user and control traffic
- Aggregate backbone Ethernet connectivity for management traffic (in-band or out-of-band)
- Connection to a cascaded shelf (future feature)
- L2 switch forwarding capabilities
- Internal and external traffic VLAN encapsulation
- QoS marking
- Overall operation, control and shelf management, including AU diagnostics and control, PSU monitoring, AVU management and redundancy support

- Local and remote extensive management support via CLI (Telnet, SSH) and SNMP, including software download, fault and performance management
- Alarm management, including external alarm inputs and activation of external devices
- Synchronization, including GPS receiver interface, clock and IF reference generation and distribution to the shelf modules, and holdover handling
- Security functionalities such as rate limiting and access control lists

When operating in ASN-GW mode, the following additional ASN-GW functions are supported:

- EAP authenticator
- RADIUS AAA client
- AAA accounting client
- MS policy profile storage
- QoS service flow authorization
- Classification of downlink data into service flows
- Packet header suppression functionality
- DHCP functionality
- Handover functionality
- GRE encapsulation/decapsulation
- IP-in-IP encapsulation/decapsulation
- Fragmentation/reassembly
- R4/R6/R3 interfaces implementation

When several shelves are collocated, the NPU cascade interface can be used for shelf interconnection. In this architecture, the NPU that is directly connected to

the backhaul implements a layer-2 connection toward the NPUs in the cascaded shelves. Bearer, control and management traffic is sent over the cascade connection. Synchronization and GPS backup power are sent toward the NPUs in the cascaded shelves through the GPS/SYNC ports.

GPS synchronization cascading will be implemented in a future release.

### 1.3.3 AU

The Access Unit module performs the WiMAX/IEEE 802.16e BS function according to the NWG Profile C definitions via digital signal processors (DSPs) and field-programmable gate array (FPGA) technology. The AU module is designed to support high-traffic throughput and enable diversity, MIMO and AAS, thereby extending capacity and range.

The AU implements the following functionality:

- 802.16e multi-channel OFDMA PHY
- Up to four-channel support (Tx/Rx)
- Diversity and future AAS
- Flexible channel bandwidth - up to 20 MHz
- Flexible FFT size - up to 2048 points
- Wide variety of reuse patterns
- Advanced channel coding (CTC)
- HARQ
- Rate adaptation
- High-performance CDMA detector
- IF interface to RF ODU
- MAC-PHY interface
- Link management (network entry, basic capabilities negotiation, authentication and registration, connection management)

- Fragmentation/ reassembly
- QoS PEP for air interface traffic
- QoS DSCP marking
- Scheduling - connections quota computation for all data delivery types
- Frame/burst building
- Power save
- Handover management
- Power control
- R1/R6/R8 functionality
- Data path mapping between R6 (GRE) and 802.16e interfaces
- Traffic authentication and encryption
- Authentication relay
- Security key receiver
- Context client/server
- ID to IP address resolution for ASN entities

The AU is built according to the Software-Defined Radio SDR approach, making it a highly flexible platform. Utilization of this approach also enables enhancing the BS capabilities and capacity via software upgrades only, to add more features, and to comply with future WiMAX Forum profiles. In addition, the SDR approach prepares the AU for adaptive beam-forming. The AU design is based on Alvarion's programmable, off-the-shelf, cutting-edge components, in order to provide a future-proof solution with excellent cost and performance.

The AU card interfaces with the NPU card for R6/R8 functionality, as well as control, synchronization and management between the NPU and AU.

The AU implements four receive and transmit channels, each of them is HW-ready for up to 20 MHz bandwidth.

### 1.3.4 PIU

The single-Euro Power Interface Unit module serves as the interface between the DC power source and both the PSU modules and external ODU radio transceivers.

The PIU filters and stabilizes the input power, and protects the system from power problems such as over-voltage, surge pulses, reverse polarity connection, and short circuits. It filters high-frequency interference (radiated emissions) and low-frequency interference (conducted emissions) at the external power source. Each shelf contains two slots for optional 1+1 PIU redundancy. One PIU is sufficient to support a fully populated shelf, and two modules provide redundant power feeding (i.e. from two input sources), while avoiding current flow between the two input sources.

### 1.3.5 PSU

The single-Euro Power Supply Unit module is a -48 VDC power supply unit that generates low-voltage DC output to comply with PICMG 2.x standard requirements. Each shelf can contain up to four PSU modules supporting N+1 redundancy configuration scheme.

Table 1-2 displays the number of PSU modules (excluding redundant units) required for various Base Station configurations without NPU redundancy (one NPU):

**Table 1-2: PSU Requirements, Configurations with one NPU (excluding PSU redundancy)**

| Number of AUs | Minimum Required Number of PSUs |
|---|---|
| 1 - 4 | 2 |
| 5 - 6 | 3 |

### 1.3.6 AVU

The 2U-high AVU includes a 1U-high integral chamber for inlet airflow and a 1U-high fan tray with an internal alarm module. To support high availability, the fan tray includes 10 brushless fans (9 fans are sufficient for cooling a fully-loaded shelf). Fan failure is indicated by both the front panel LEDs and a trap sent to the management system. To further support high availability, the chassis may operate without the hot-swappable fan tray for up to 10 minutes until the AVU is replaced.

### 1.3.7 ODU

The outdoor unit (ODU) is a high-power, multi-carrier radio unit that connects to one or more external antennas. It is designed to provide high system gain and interference robustness utilizing high transmit power and low noise figure. It is HW-ready for supporting a bandwidth of up to 20 MHz, enabling future options such as increased capacity through the use of a multiplexer or wider frequency channels.

The following ODU port configurations will be available:

- 1x1(1Rx by 1 Tx): One receive port, one transmit port
- 2x1 (2Rx by 1Tx): Two receive ports, one transmit port
- 4x2 (4Rx by 1Tx): Four receive ports, two transmit ports

In the current release only 1x1 and 4x2 ODUs are available.

The wide range of ODU types will enable efficient utilization of various second and fourth order transmit and receive diversity schemes.

The following table provides details on the currently available ODUs following the WiMAX Forum's definitions:

**Table 1-3: ODU Types**

| Band (GHz) | ODU Frequency Range (MHz) | ODU Port Configuration | ODU Bandwidth (MHz) | ODU Max Tx Power (dBm) |
|---|---|---|---|---|
| 2.3 | 2300-2360 | 1Rx by 1Tx | Up to 10 | 36 |
| 2.5 | 2496-2602 (band A) | 1Rx by 1Tx | Up to 10 | 36 |
| | 2590-2690 (band B) | 1Rx by 1Tx | Up to 10 | 36 |
| | 2496-2602 (band A) | 4Rx by 2Tx | Up to 20 | 38 |
| | 2590-2690 (band B) | 4Rx by 2Tx | Up to 20 | 38 |
| 3.x | 3400-3455 | 1Rx by 1Tx | Up to 14 | 34 |
| | 3445-3500 | 1Rx by 1Tx | Up to 14 | 34 |
| | 3500-3555 | 1Rx by 1Tx | Up to 14 | 34 |
| | 3545-3600 | 1Rx by 1Tx | Up to 14 | 34 |
| | 3400-3600 | 4Rx by 2Tx | Up to 20 | 37 |
| | 3600-3800 | 4Rx by 2Tx | Up to 20 | 37 |

### 1.3.8 Power Feeder

The PIU can support a maximum current of 58 A (@-40.5 VDC). In certain installations with a relatively high number of ODUs this current may not be sufficient to power the shelf and all the ODUs. In such installations the ODU Power Feeder is used as an additional power source providing power (-48 VDC) to ODUs. It transfers transparently all signals between the AU and the ODU, while injecting DC power received from an external source. Each ODU Power Feeder unit can serve up to four ODUs. Up to three ODU Power Feeder units can be installed in a 1U high Power Feeder panel.

The Power Feeder is not applicable for the configurations supported in the current release. It will be necessary in the future to support configurations with 6 AUs where each AU is connected to either six 1x1 ODUs or one 4x2 ODU.

### 1.3.9 Antenna

In the 4Motion architecture, the antenna is approached as an independent element. This provides the operator with the flexibility to select the antennas source according to its supplier policy. To ensure the availability of antennas that complement the 4Motion solution, Alvarion works closely with several antenna suppliers to ensure availability of antennas that comply with its requirements.

In cases where the operator prefers other antenna vendors, Alvarion can provide a recommended antenna specification based on the required antennas types.

For more information on recommended antenna configurations and required antennas refer to Appendix A.

## 1.3.10 GPS

GPS is used to synchronize the air link frames of Intra-site and Inter-site located Base Transceiver Stations to ensure that in all Base Stations the air frame will start at the same time, and that all Base Stations will switch from transmit (downlink) to receive (uplink) at the same time. This synchronization is necessary to prevent Intra-site and Inter-site interference and Base stations saturation (assuming that all Base Stations are operating with the same frame size and with the same DL/UL ratio).

In order for the system to be synchronized, the GPS have to first acquire at least 4 satellites. After that the GPS reception can be reduced to 1 satellite.If no satellite is received the BTS will go to holdover state where internal clock is provided to synchronize the BTS.

### 1.3.10.1 Outdoor GPS Receiver

The all-outdoor GPS Receiver is a pole mountable GPS receiver and antenna in a single environmentally protected enclosure. The GPS Receiver is powered by a 12 VDC power source, supplied to it by the NPU. The RS-422 interface allows installation at distances up to 100m.

# 1.4 Element Management Systems

The end-to-end IP-based architecture of the system enables full management of all components, using standard management tools. An SNMP agent in the NPU implements proprietary MIBs for remote setting of operational modes and parameters of the Base Transceiver Station equipment. Security features incorporated in the equipment restrict the access for management purposes.

Alvarion offers the following management tool:

## 1.4.1 AlvariSTAR™

AlvariSTAR is a comprehensive carrier-class Element Management System (EMS) for Alvarion's Broadband Wireless Access systems. AlvariSTAR is designed for today's most advanced Network Operation Centers (NOCs), providing the network Operation, Administration and Maintenance (OA&M) staff and managers with all the network surveillance, monitoring and configuration and service provisioning capabilities required to effectively manage the network while keeping the resources and expenses at a minimum.

AlvariSTAR offers the network's OA&M staff with a unified, scalable and distributable management system. Utilizing distributed client-server architecture, the user is provided with a robust, scalable and fully redundant management system in which all single points of failure can be avoided.

AlvariSTAR provides the following management functionality:

- Device Discovery
- Device Inventory
- Topology
- Fault Management
- Configuration Management
- Service Management
- Data Collection
- Performance Monitoring

- Device embedded software upgrade
- Security Management
- Northbound interface to other Network Management Systems.

# 1.5 Specifications

## 1.5.1 Modem & Radio

**Table 1-4: General Modem & Radio Specifications**

| Item | Description |
|---|---|
| Operation Mode | TDD |
| Channel Bandwidth | ■ 5 MHz<br>■ 10 MHz |
| Central Frequency Resolution | 0.125 MHz (actual configurable frequencies depend on the local radio regulations and allocated spectrum) |
| Modulation | OFDM modulation, 1024/512 FFT points;<br>QPSK, QAM16, QAM64 |
| Access Method | OFDMA |
| FEC | Convolutional Turbo Coding: 1/2, 2/3, 3/4, 5/6 |

## 1.5.2 Sensitivity

**Table 1-5: Sensitivity, AWGN @ PER=1%**

| Modulation & Coding | Sensitivity (dBm), 5 MHz Bandwidth | Sensitivity (dBm), 10 MHz Bandwidth |
|---|---|---|
| QPSK 1/2 | -97.3 | -94.2 |
| QPSK 3/4 | -94.9 | -91.8 |
| 16QAM 1/2 | -92.2 | -89.1 |
| 16QAM 3/4 | -88.3 | -85.2 |
| 64QAM1/2 | -86.8 | -83.7 |
| 64QAM2/3 | -83.0 | -79.9 |
| 64QAM3/4 | -82.2 | -79.1 |
| 64QAM5/6 | -81.0 | -77.9 |

## 1.5.3 ODUs

### 1.5.3.1 2.3 GHz Band

**Table 1-6: 1x1 ODU-HP-2.3 Specifications**

| Item | Description |
|---|---|
| Frequency Band | 2300-2360 MHz |
| Ports Configuration | 1x1 (1Rx, 1Tx) |
| Bandwidth Support | Up to 10 MHz, 5 & 10 MHz SAW filters |
| Maximum Tx Power ) | 36 dBm |
| Tx Power Control Range | 6 dB, in 1 dB steps |
| Tx Power Accuracy | +/- 1 dB |
| Maximum Input Power @ antenna port | -60 dBm before saturation, -8 dBm before damage |
| Noise Figure | 4.6 dB typical, 6.0 dB maximum |
| Dimension | 329 x 157 x 169 mm |
| Weight | 6.1 Kg |
| Connectors | ANT: N-Type jack, 50 Ohm, lightning protected<br>IF: TNC jack, 50 Ohm, lightning protected |
| Power Source | -40.5 to -60 VDC over the IF cable |
| Power Consunption | Transmit - 89W maximum, 75W typical<br>Receive - 15W maximum, 9W typical |

### 1.5.3.2 2.5 GHz Band

**Table 1-7: 2.5 GHz Band 1x1 ODUs Specifications**

| Item | Description |
|---|---|
| Frequency Band | ODU-HP-2.5A: 2496-2602 MHz (Band A)<br>ODU-HP-2.5B: 2590-2690 MHz (Band B) |
| Ports Configuration | 1x1 (1Rx, 1Tx) |
| Bandwidth Support | Up to 10 MHz |
| Maximum Tx Power ) | 36 dBm |
| Tx Power Control Range | 6 dB, in 1 dB steps |
| Tx Power Accuracy | +/- 1 dB |
| Maximum Input Power @ antenna port | -60 dBm before saturation, -8 dBm before damage |
| Noise Figure | 4.6 dB typical, 6.0 dB maximum |
| Dimension | 329 x 157 x 209 mm |
| Weight | 6.1 Kg |
| Connectors | ANT: N-Type jack, 50 Ohm, lightning protected<br>IF: TNC jack, 50 Ohm, lightning protected |
| Power Source | -40.5 to -60 VDC over the IF cable |
| Power Consunption | Transmit - 89W maximum, 75W typical<br>Receive - 15W maximum, 9W typical |

**Table 1-8: 2.5 GHz Band 4x2 ODUs Specifications**

| Item | Description |
|---|---|
| Frequency Band | ODU-2496-2602-000N-38-4x2-N-0: 2496-2602 MHz (Band A)<br>ODU-2590-2690-000N-38-4x2-N-0: 2590-2690 MHz (Band B) |
| Ports Configuration | 4x2 (4Rx, 2Tx) |
| Bandwidth Support | Up to 20 MHz |
| Maximum Tx Power ) | 38 dBm |
| Tx Power Control Range | 10 dB, in 1 dB steps |
| Tx Power Accuracy | +/- 1 dB |
| Maximum Input Power @ antenna port | -60 dBm before saturation, -8 dBm before damage |
| Noise Figure | 4.5 dB typical, 5.5 dB maximum |
| Dimension | 420 x 340 x 270 mm |
| Weight | 15 Kg |
| Connectors | ANT: 4 x N-Type jack, 50 Ohm, lightning protected<br>IF: 4 x TNC jack, 50 Ohm, lightning protected |
| Power Source | -40.5 to -60 VDC over the IF cable |
| Power Consunption | Transmit - 284W maximuml<br>Receive - 70W maximum |

### 1.5.3.3 3.x GHz Band

**Table 1-9: 3.x GHz Band 1x1 ODUs Specifications**

| Item | Description |
|---|---|
| Frequency Band | ODU-HP-TDD-3.4a: 3400-3455 MHz<br>ODU-HP-TDD-3.4b: 3445-3500 MHz<br>ODU-HP-TDD-3.5a: 3500-3555 MHz<br>ODU-HP-TDD-3.5b: 3545-3600 MHz |
| Ports Configuration | 1x1 (1Rx, 1Tx) |
| Bandwidth Support | Up to 14 MHz |
| Maximum Tx Power | 34 dBm |
| Tx Power Control Range | 10 dB, in 1 dB steps |
| Tx Power Accuracy | +/- 1 dB |
| Maximum Input Power @ antenna port | -60 dBm before saturation, -8 dBm before damage |
| Noise Figure | 4.5 dB typical, 5.5 dB maximum |
| Dimension | 329 x 157 x 169 mm |
| Weight | 6.1 Kg |
| Connectors | ANT: N-Type jack, 50 Ohm, lightning protected<br>IF: TNC jack, 50 Ohm, lightning protected |
| Power Source | -40.5 to -60 VDC over the IF cable |
| Power Consunption | Transmit - 90W maximum, 62W typical<br>Receive - 20W maximum, 14W typical |

**Table 1-10: 3.x GHz Band 4x2 ODUs Specifications**

| Item | Description |
|---|---|
| Frequency Band | ODU-3400-3600-000N-37-4x2-N-0: 3400-3600 MHz<br>ODU-3600-3800-000N-37-4x2-N-0: 3600-3800 MHz |
| Ports Configuration | 4x2 (4Rx, 2Tx) |
| Bandwidth Support | Up to 20 MHz |
| Maximum Tx Power ) | 387 dBm |
| Tx Power Control Range | 10 dB, in 1 dB steps |
| Tx Power Accuracy | +/- 1 dB |
| Maximum Input Power @ antenna port | -60 dBm before saturation, -8 dBm before damage |
| Noise Figure | 4.5 dB typical, 5.5 dB maximum |
| Dimension | 420 x 340 x 270 mm |
| Weight | 15 Kg |
| Connectors | ANT: 4 x N-Type jack, 50 Ohm, lightning protected<br>IF: 4 x TNC jack, 50 Ohm, lightning protected |
| Power Source | -40.5 to -60 VDC over the IF cable |
| Power Consunption | Transmit - 216W maximuml<br>Receive - 24W maximum |

## 1.5.4 AU - ODU Communication

**Table 1-11: AU - ODU Communication**

| Item | Description |
|---|---|
| IF Frequency | ■ Tx: 240 MHz<br>■ Rx: 140 MHz |
| Ref Synchronization Frequency | 64 MHz |
| Bi-Directional Control Frequency | 14 MHz |
| IF cable Impedance | 50 Ohm |
| Maximum IF cable Attenuation | 10 dB @ 240 MHz<br>7.5 dB @ 140 MHz<br>8 dB @ 64 MHz |
| Minimum IF cable Shielding Effectiveness | 90 dB in the 10-300 MHz band |
| Maximum IF cable Return Loss | 20 dB in the 10-300 MHz band |
| Maximum IF cable DC Resistance | 1.5 Ohm |

## 1.5.5 Data Communication (Ethernet Interfaces)

**Table 1-12: Data Communication (Ethernet Interfaces)**

| Item | | Description |
|---|---|---|
| Standard Compliance | | IEEE 802.3 CSMA/CD |
| Speed | NPU Data Port | 100/1000 Mbps, Full Duplex with Auto Negotiation |
| | NPU Management Port | 10/100 Mbps, Half/Full Duplex with Auto Negotiation |
| | NPU Cascade Port | 100/1000 Mbps, Full Duplex with Auto Negotiation |
| | AU Calibration Port | 10/100 Mbps, Half/Full Duplex with Auto Negotiation |

## 1.5.6 Configuration and Management

**Table 1-13: Configuration and Management**

| Item | Description |
|---|---|
| Out Of Band (OOB) Management | ■ Telnet via Management port<br>■ SSH via Management port<br>■ SNMP via Management port<br>■ Telnet via Cascade port<br>■ SSH via Cascade port<br>■ SNMP via Cascade port<br>■ Monitor port (serial interface) |
| In Band (IB) Management via Data Port | ■ SNMP<br>■ Telnet<br>■ SSH |
| SNMP Agents | SNMP ver 2 client<br>MIB II (RFC 1213), Private MIBs |
| Software Upgrade | Using TFTP |
| Configuration Upload/Download | Using TFTP |

## 1.5.7 Standards Compliance, General

**Table 1-14: Standards Compliance, General**

| Type | Standard |
|---|---|
| EMC | ETSI EN 301 489-1/4 |
| Safety | ■ EN60950-1 (CE)<br>■ UL 60950-1 US/C (TUV) |
| Environmental | ETS 300 019:<br>■ Part 2-1 T 1.2 & part 2-2 T 2.3 for indoor & outdoor<br>■ Part 2-3 T 3.2 for indoor<br>■ Part 2-4 T 4.1E for outdoor |
| Radio | ■ ETSI EN 302 326<br>■ FCC part 15, part 27 |

## 1.5.8 Environmental

**Table 1-15: Environmental Specifications**

| Type | Unit | Details |
|---|---|---|
| Operating Temperature | Outdoor units | ODUs: -40°C to 55°C<br>Outdoor GPS Receiver: -40°C to 85°C |
| | Indoor equipment | 0°C to 40°C |
| Operating Humidity | Outdoor units | 8%-100%, weather protected |
| | Indoor equipment | 5%-95% non condensing |

## 1.5.9 Mechanical and Electrical

1U = 44.45 mm (1.75”).

1HP = 5.08 mm (0.2”)

### 1.5.9.1 BreezeMAX Shelf

**Table 1-16: BreezeMAX Shelf, Mechanical & Electrical Specifications**

| Item | Description |
|---|---|
| Dimensions | 8U ETSI type shelf, 8U x 43.2 x 24 cm |
| Weight | 6.9 Kg (excluding AVU) |

### 1.5.9.2 PIU

**Table 1-17: PIU, Mechanical & Electrical Specifications**

| Item | Description |
|---|---|
| Dimensions | 3U x 5HP x 16 cm |
| Weight | 0.45 Kg |
| Power Source | -40.5 to -60 VDC |
| Power Dissipation | 35W maximum (active PIU) |
| Maximum Supplied Current | 58A |
| -48V Connector | 5 pin/40A D-Type plug |

### 1.5.9.3 PSU

**Table 1-18: PSU, Mechanical & Electrical Specifications**

| Item | Description |
|---|---|
| Dimensions | 3U x 5HP x 16 cm |
| Weight | 0.7 Kg |
| Power Output | 300W maximum output power<br>Efficiency: 80% minimum |

### 1.5.9.4 NPU

**Table 1-19: NPU, Mechanical & Electrical Specifications**

| Item | | Description |
|---|---|---|
| Dimensions | | 6U x 7HP x 16 cm |
| Weight | | 0.7 Kg |
| Power Consumption | | 68W maximum, 61W typical |
| Connectors | DATA | 100/1000Base-T (RJ-45) with 2 embedded LEDs |
| | MGMT | 10/100Base-T (RJ-45) with 2 embedded LEDs |
| | GPS/SYNC IN | 15-pin micro D-Type jack |
| | GPS/SYNC OUT | 15-pin micro D-Type jack |
| | CSCD | 100/1000Base-T (RJ-45) with 2 embedded LEDs |
| | ALRM IN/OUT | 25-pin micro D-Type jack |
| | MON | 3-pin low profile jack |

### 1.5.9.5 AU

**Table 1-20: AU, Mechanical & Electrical Specifications**

| Item | | Description |
|---|---|---|
| Dimensions | | 6U x 7HP x 16 cm |
| Weight | | 0.6 Kg |
| Power Consumption | | 74W maximum, 66W typical |
| Connectors | ODU1 - ODU4 | 4 x TNC jack, lightning protected |
| | CAL UNIT | 10/100Base-T (RJ-45) with 2 embedded LEDs |

### 1.5.9.6 GPS Receiver

**Table 1-21: GPS Receiver, Mechanical & Electrical Specifications**

| Item | Description |
|---|---|
| Dimensions | Tubular enclosure, 15.5 D x 12.7 H cm |
| Weight | 0.363 Kg |
| Power Source | 12 VDC from the NPU |
| Power Consumption | 6W maximum |
| Connector | 12-pin round plug |

### 1.5.9.7 ODU Power Feeder

**Table 1-22: ODU Power Feeder, Mechanical & Electrical Specifications**

| Item | | Description |
|---|---|---|
| Dimensions | | 15.7 x 14.6 x 3.17 cm |
| Weight | | 0.6 Kg |
| Power Source | | -40.5 to -60 VDC |
| Power Dissipation | | 2W per channel |
| Connectors | ODU 1 - ODU 4 | 4 x TNC jack, lightning protected |
| | IDU 1 - IDU 4 | 4 x TNC jack, lightning protected |
| | Power | 3 pin/20A D-Type plug |

## 1.5.10 Antennas

### 1.5.10.1 2.x GHz Antennas

**Table 1-23: BS-RET-DP-ANT 2.3-2.7 Specifications**

| Item | Description |
|---|---|
| Frequency Band (MHz) | 2300-2700 |
| Number of Elements | 2 |
| Polarization | Linear, +/-45° |
| Gain (dB) | 17.3 @ 2.4 GHz<br>18 @ 2.6 GHz |
| Azimuth Beamwidth (degrees) | 65 |
| Elevation Beamwidth (degrees) | 6.5 |
| Elevation Side Lobe Level (dB) | <-18 |
| Maximum Power (W) | 250 |
| Cross-polarization Discrimination (dB) | >15 |
| Front-to-Back Ratio (dB) | >30 |
| Electrical Downtilt Range (degrees) | 0-10 |
| Remote Electrical Downtilt Support | Internal motor, AISG version 2 compliant |
| Isolation Between Ports (dB) | >30 |
| Return Loss (dB) | >15 |
| RF Interface Impedance (Ohm) | 50 |
| RF Connectors | 2 x N-Type jack |
| RET Connector | 8-pin IEC 60130-9 |
| Dimensions (mm) | 1060 x 126 x 69 |
| Weight (Kg) | 6 |
| Wind Load (Kg) | 0.24 @ 160 km/h |
| Maximum Wind Velocity (km/h) | 200 |

**Table 1-24: BS-RET-DDP-ANT 2.3-2.7 Specifications**

| Item | Description |
|---|---|
| Frequency Band (MHz) | 2300-2700 |
| Number of Elements | 4 |
| Polarization | Linear, 2 x +/-45° |
| Gain (dB) | 17.3 @ 2.4 GHz<br>18 @ 2.6 GHz |
| Azimuth Beamwidth (degrees) | 65 |
| Elevation Beamwidth (degrees) | 6.5 |
| Elevation Side Lobe Level (dB) | <-18 |
| Maximum Power (W) | 250 |
| Cross-polarization Discrimination (dB) | >15 |
| Front-to-Back Ratio (dB) | >30 |
| Electrical Downtilt Range (degrees) | 0-10 |
| Remote Electrical Downtilt Support | Internal motor, AISG version 2 compliant |
| Isolation Between Ports (dB) | >30 |
| Return Loss (dB) | >15 |
| RF Interface Impedance (Ohm) | 50 |
| RF Connectors | 4 x N-Type jack |
| RET Connector | 8-pin IEC 60130-9 |
| Dimensions (mm) | 1070 x 300 x 110 |
| Weight (Kg) | 13 |
| Wind Load (Kg) | 0.48 @ 160 km/h |
| Maximum Wind Velocity (km/h) | 200 |

### 1.5.10.2 3.5 GHz Antennas

**Table 1-25: BS-RET-DP-ANT 3.3-3.8 Specifications**

| Item | Description |
|---|---|
| Frequency Band (MHz) | 3300-3800 |
| Number of Elements | 2 |
| Polarization | Linear, +/-45° |
| Gain (dB) | 18 |
| Azimuth Beamwidth (degrees) | 65 |
| Elevation Beamwidth (degrees) | 6.5 |
| Elevation Side Lobe Level (dB) | <-18 |
| Maximum Power (W) | 200 |
| Cross-polarization Discrimination (dB) | >15 |
| Front-to-Back Ratio (dB) | >30 |
| Electrical Downtilt Range (degrees) | 0-10 |
| Remote Electrical Downtilt Support | Internal motor, AISG version 2 compliant |
| Isolation Between Ports (dB) | >30 |
| Return Loss (dB) | >15 |
| RF Interface Impedance (Ohm) | 50 |
| RF Connectors | 2 x N-Type jack |
| RET Connector | 8-pin IEC 60130-9 |
| Dimensions (mm) | 760 x 126 x 69 |
| Weight (Kg) | 4.5 |
| Wind Load (Kg) | 0.17@ 160 km/h |
| Maximum Wind Velocity (km/h) | 200 |

**Table 1-26: BS-RET-DDP-ANT 3.3-3.8 Specifications**

| Item | Description |
|---|---|
| Frequency Band (MHz) | 3300-3800 |
| Number of Elements | 4 |
| Polarization | Linear, 2 x +/-45° |
| Gain (dB) | 18 |
| Azimuth Beamwidth (degrees) | 65 |
| Elevation Beamwidth (degrees) | 6.5 |
| Elevation Side Lobe Level (dB) | <-18 |
| Maximum Power (W) | 200 |
| Cross-polarization Discrimination (dB) | >15 |
| Front-to-Back Ratio (dB) | >30 |
| Electrical Downtilt Range (degrees) | 0-10 |
| Remote Electrical Downtilt Support | Internal motor, AISG version 2 compliant |
| Isolation Between Ports (dB) | >30 |
| Return Loss (dB) | >15 |
| RF Interface Impedance (Ohm) | 50 |
| RF Connectors | 4 x N-Type jack |
| RET Connector | 8-pin IEC 60130-9 |
| Dimensions (mm) | 750 x 300 x 110 |
| Weight (Kg) | 10.5 |
| Wind Load (Kg) | 0.34 @ 160 km/h |
| Maximum Wind Velocity (km/h) | 200 |

2

# Chapter 2 - Installation

## In This Chapter:


- “Installing the ODU” on page 42.
- “Installing the Antennas” on page 61
- “Installing the Base Transceiver Station (BTS) Equipment” on page 64
- “Installing the ODU Power Feeder” on page 82
- “Installing the Outdoor GPS Receiver” on page 86
- “Connecting the GPS Cables” on page 87

# 2.1 Installing the ODU

The following sections describe how to install the ODU, including pole mounting the ODU and connecting the cables.

## 2.1.1 Guidelines for Positioning the ODU

This section provides key guidelines for selecting the optimal installation locations for the ODU See also Section 2.2.1 for guidelines on installing the antennas.

**CAUTION**

ONLY experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities should install outdoor units and antennas.

Failure to do so may void the BreezeMAX product warranty and may expose the end user or Service Provider to legal and financial liabilities. Alvarion and its resellers or distributors are not liable for injury, damage or regulation violations associated with the installation of Outdoor Units or antennas.

Select the optimal locations for the equipment using the following guidelines:

- The ODU is pole mounted. Its location should enable easy access to the unit for installation and testing.
- When mounting several ODUs on a pole, make sure that at least one side of the pole is clear, to enable easy access to all the ODUs.
- The ODU should be installed as close as possible to the antenna.

## 2.1.2 IF Cables

ODUs are connected to the AU (or to the ODU Power Feeder) via IF cables carrying both signals and power. The maximum permitted attenuation of the IF cable at applicable frequencies, its screening effectiveness and its maximum permitted DC resistance (the sum of the DC resistance of the inner and outer conductors) are provided in the following table.

**Table 2-1: IF Cables Requirements**

| Item | Description |
|---|---|
| Screening Effectiveness | 90 dB minimum in the 10-300 MHz band. |
| IF cable Impedance | 50 Ohm |
| Maximum IF cable Attenuation | 10 dB @ 240 MHz<br>7.5 dB @ 140 MHz<br>8 dB @ 64 MHz |
| Maximum IF cable DC Resistance | 1.5 Ohm |
| Maximum IF cable Return Loss | 20 dB in the 10-300 MHz band |

Use only double shielded cables. Avoid using a single shielded cable even if it complies with these requirements. The following table provides details on maximum length for some popular double shielded cables.

**Table 2-2: Maximum IF Cable Length (Double Shielded Cables)**

| Cable | Maximum Length for ODU |
|---|---|
| LMR-195 | 30 meters |
| LMR-240 | 60 meters |
| LMR-400 | 150 meters |

# 2.1.3 Installing the 1x1 ODU

## 2.1.3.1 1x1 ODU (ODU-HP) Installation Requirements

### 2.1.3.1.1 ODU Packing List

- ODU
- Pole mounting kit

### 2.1.3.1.2 Additional Installation Requirements

The following items are also required to install the ODU:

- IF cable with two TNC connectors* (see Section 2.1.3 for details on IF cable types and length).
- Antenna* and RF cable* for connecting the antenna to the ODU.
- Grounding cable with an appropriate termination.
- Installation tools and materials, including appropriate means (e.g. a 1" to 4" pole) for installing the ODU and antenna.

**NOTE**

Items marked with an asterisk (*) are available from Alvarion.

## 2.1.3.2 Pole Mounting the ODU

The ODU can be mounted on a 1" to 4" pole using one of the following options:

- Special clamps and threaded rods are supplied with each unit. There are two pairs of threaded holes on the back of the unit, enabling to use the clamps for mounting the unit on diverse pole diameters.
- The protrusions with grooves on the top backsides of the unit, and the protrusion on the bottom backside, enable the use of 9/16" wide metal bands (not included with the package) to secure the unit to a pole.

**NOTE**

Install the unit with the bottom panel, which includes the LEDs, facing downward.

#### 2.1.3.2.1 Pole Mounting the ODU Using Clamps

Figure 2-1 illustrates the method of mounting a ODU on a pole, using the clamps and threaded rods.

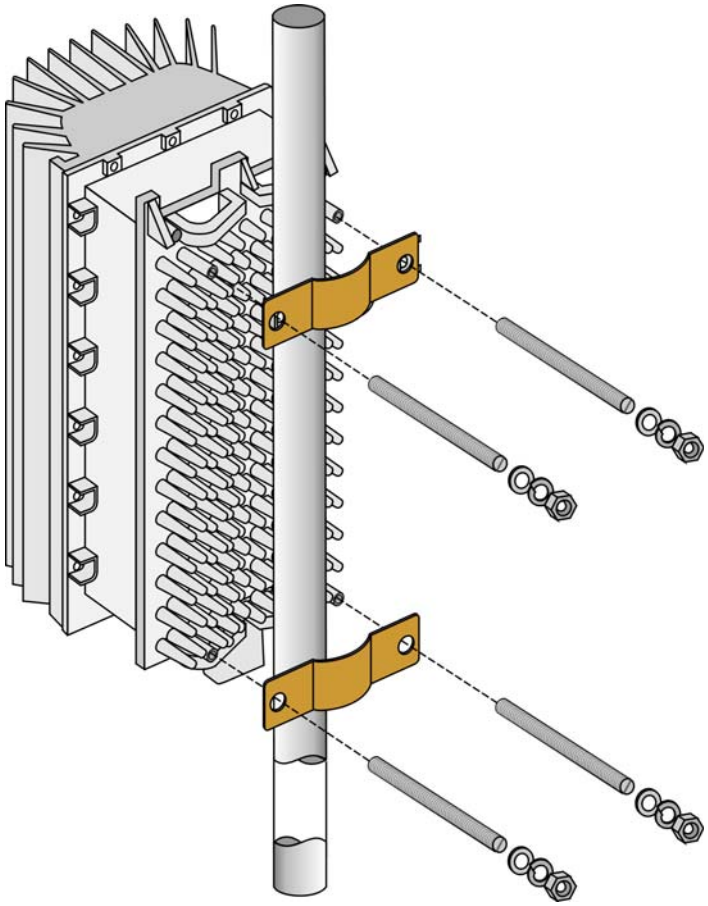


**Figure 2-1: ODU Pole Installation Using Special Clamps**

**NOTE**

There is a groove on one end of the threaded rod. Insert the threaded rods with the grooves pointing outward, as these grooves enable you to use a screwdriver to fasten the rods to the unit.

#### 2.1.3.2.2 Pole Mounting the ODU Using Metal Bands

Figure 2-2 illustrates the method of mounting a ODU on a pole, using metal bands.

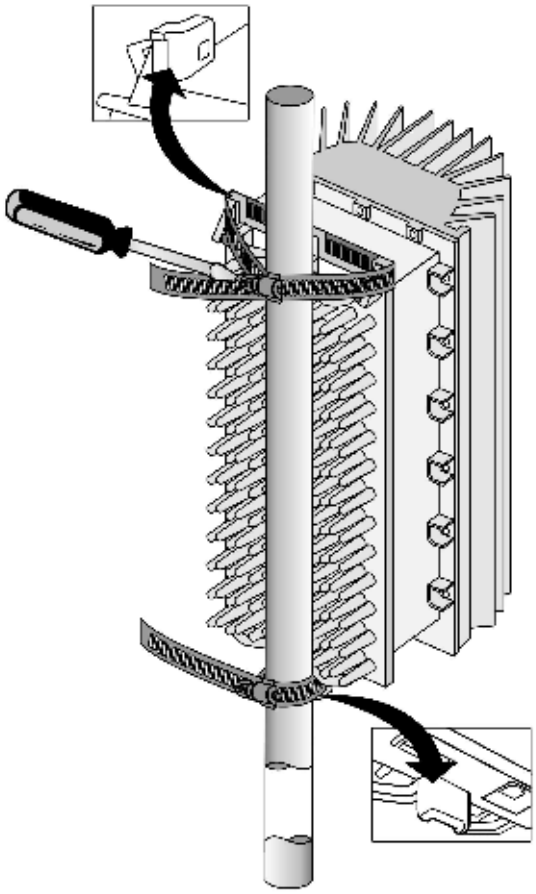


**Figure 2-2: ODU Pole Installation Using Metal Band**

### 2.1.3.3 1x1 ODU Connectors and LEDs

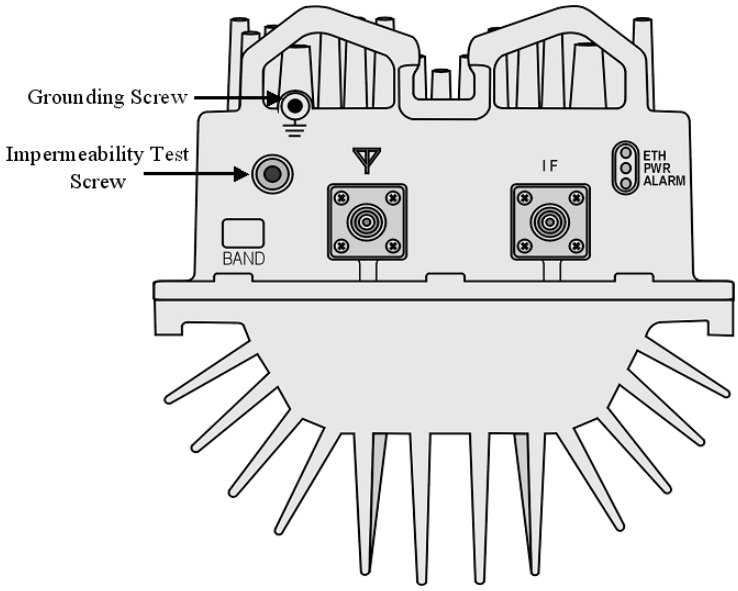



**Figure 2-3: Bottom Panel of the 1x1 ODU**

**CAUTION**

Do not open the impermeability test screw - you may impair the sealing of the unit against moisture and humidity.

**Table 2-3: 1x1 ODU LEDs**

| Name | Description | Functionality |
|---|---|---|
| PWR | Power indication | ■ Off - Power failure<br>■ Green - Power to ODU is OK, internal 3.3 VDC power supply is OK. |
| ALARM | AU-ODU communication and synthesizer status indication | ■ Off - AU-ODU communication is OK, synthesizer is locked.<br>■ Red - AU-ODU communication failure or synthesizer is not locked |
| ETH | Not Used | |

**Table 2-4: 1x1 ODU Connectors**

| Name | Connector | Functionality |
|---|---|---|
| IF | TNC jack | Connection to the AU/ODU Power Feeder |
| ANT | N-Type jack, 50 Ohm | Connection to an external antenna |
| (GND) | Grounding screw | Connection to ground (earth) |

## 2.1.4 Installing the 4x2 ODU

### 2.1.4.1 AU-ODU Package Contents

- ODU (weight 15.5 kg +/- 1.5 kg)
- Four M10X30 screws
- Pole Mounting Kit: (weight ~6 kg)
  - One Carriage for 4x2 ODU
  - Four M10x265 Threaded Rods
  - Eight M10 Nuts
  - One M6X12 Grounding Screw
  - Eight M10 Spring Washers
  - Eight M10 Flat Washers
  - Two M10 Clamps

**IMPORTANT**

The weight of each ODU is 15.5 kg (+/- 1 kg) and the weight of the Pole Mounting Kit is approximately 6 kg. Be sure to plan the installation accordingly. It is recommended to use a harness to lift the units.

Install the AU-ODUs using the supplied kit only.

### 2.1.4.2 Sun Guard Package Content

- 4x2 ODU Sun Guard
- Four M6X16 screws

### 2.1.4.3 Pole Mounting Kit for Two ODUs Package Content (Optional)

- Two Carriage for 4x2 ODU
- Four M10x265 Threaded Rods
- Eight M10 Nuts

- One M6X12 Grounding Screw
- Eight M10 Spring Washers
- Eight M10 Flat Washers

### 2.1.4.4 Additional Installation Requirements

The following items are also required to install the AU-ODU:

- 4 IF cables with two TNC connectors* (see Section 2.1.3 for details on IF cable types and length).
- Antenna(s)* and 4 RF cables* for connecting the antenna(s) to the ODU
- Grounding cable with an appropriate termination
- Installation tools and materials, including appropriate means (e.g. a 1.5" to 6" pole, a harness) for installing the ODU and antenna

**NOTE**

Items marked with an asterisk (*) are available from Alvarion.

### 2.1.4.5 4x2 ODU Installation Guidelines

The ODU can be mounted on a 1.5" to 6" pole depending on the pole construction.

To install toe ODUs it is recommended to use the optional Mounting Kit for two ODUs available from Alvarion. The installation of more than two ODUs can be carried out in one of the following ways:

1. Position the third ODU directly beneath one of the two ODUs, with a distance of 30 cm between the top and bottom carriage to allow easy routing of the cables.
2. Position the third ODU at an angle below the two ODUs. No minimum distance is required.

### 2.1.4.6 Pole Mounting One ODU

1. Open the packaging and remove the ODU and screws.

2 Insert the four M10X30 screws into the designated holes (Figure 2-4).

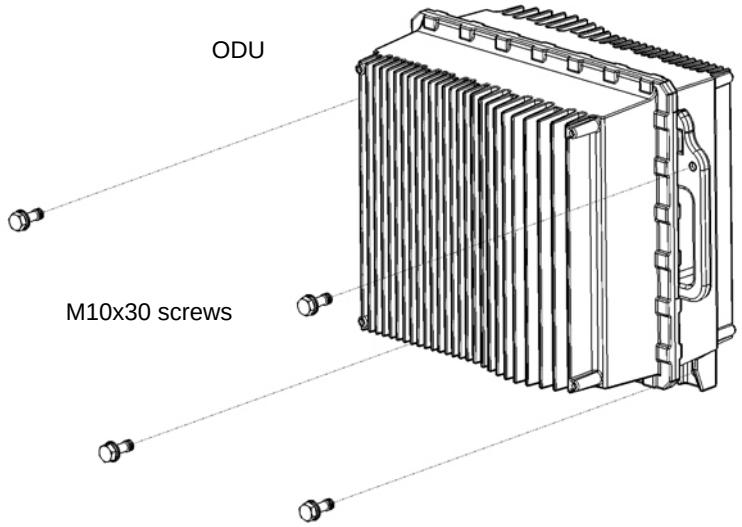



**Figure 2-4: Preparing the 4x2 ODU for Installation**

3 Position the carriage on the pole at the desired location.

4 Thread the four M10x265 threaded rods through the carriage and the rear clamps (Figure 2-5).

5 Tighten on both sides using the supplied washers, spring washers and nuts.

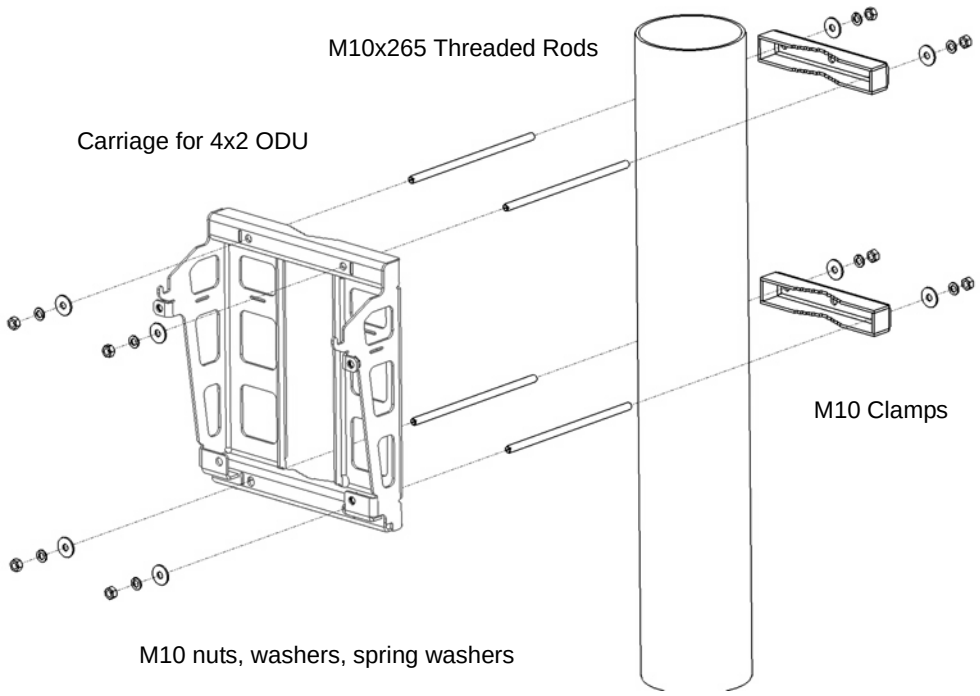



**Figure 2-5: Mounting the Single 4x2 ODU Carriage on a Pole**

6 Hang the ODU on the carriage and tighten the four M10x30 screws (Figure 2-6 and Figure 2-7).

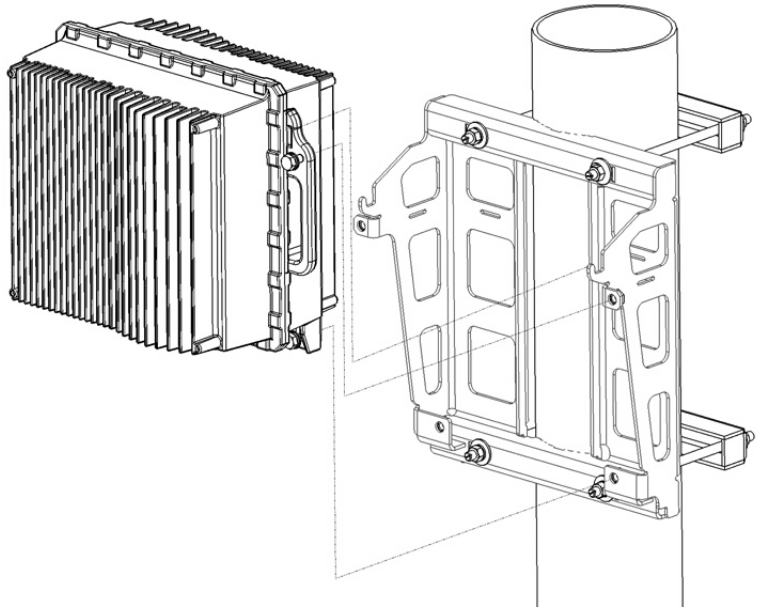


**Figure 2-6: Mounting the 4x2 ODU**

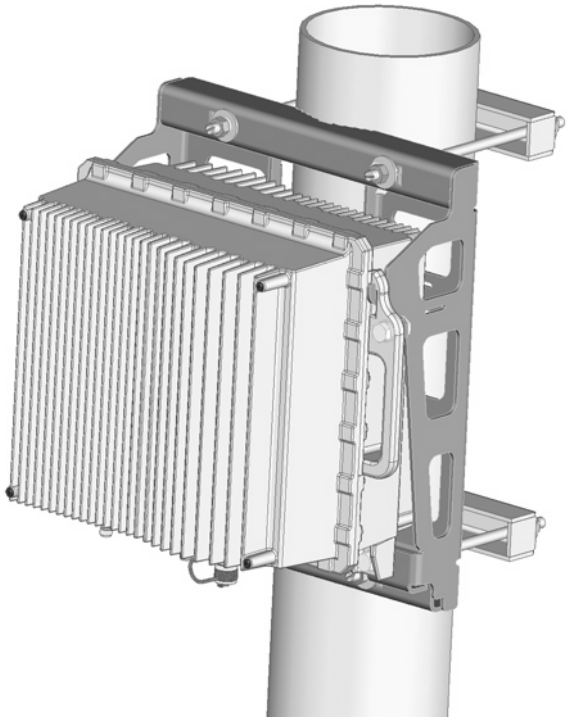


**Figure 2-7: 4x2 ODU Mounted on Pole**

### 2.1.4.7 Pole Mounting Two ODUs

1. Prepare the two ODUs for installation as shown in Figure 2-4.
2. Position both carriages at the desired location on the pole.
3. Thread the 4 M10x265 threaded rods through one carriage and tighten using the supplied washers, spring washers and nuts. Lean the carriage vertically on the pole and thread the rods through the second carriage (Figure 2-8).
4. Tighten using the washers, spring washers and nuts.

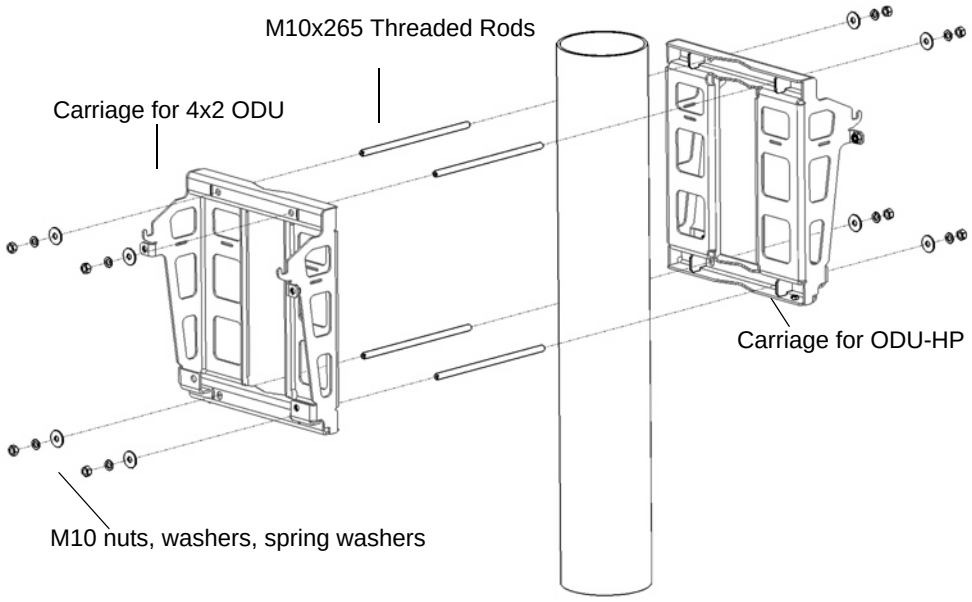



**Figure 2-8: Mounting Two Carriages on the Pole**

5. Hang the ODUs on the carriages and tighten the M10x30 screws (Figure 2-9 and Figure 2-10).

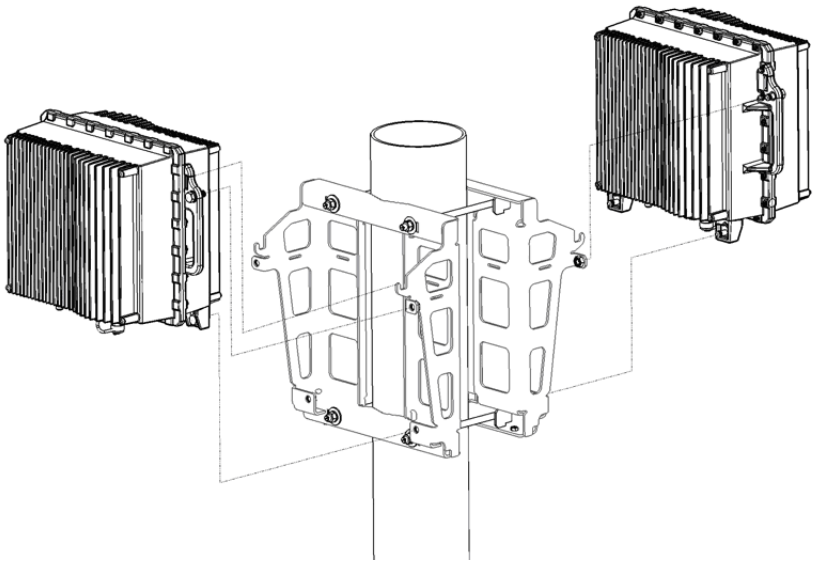


**Figure 2-9: Mounting the two ODUs**

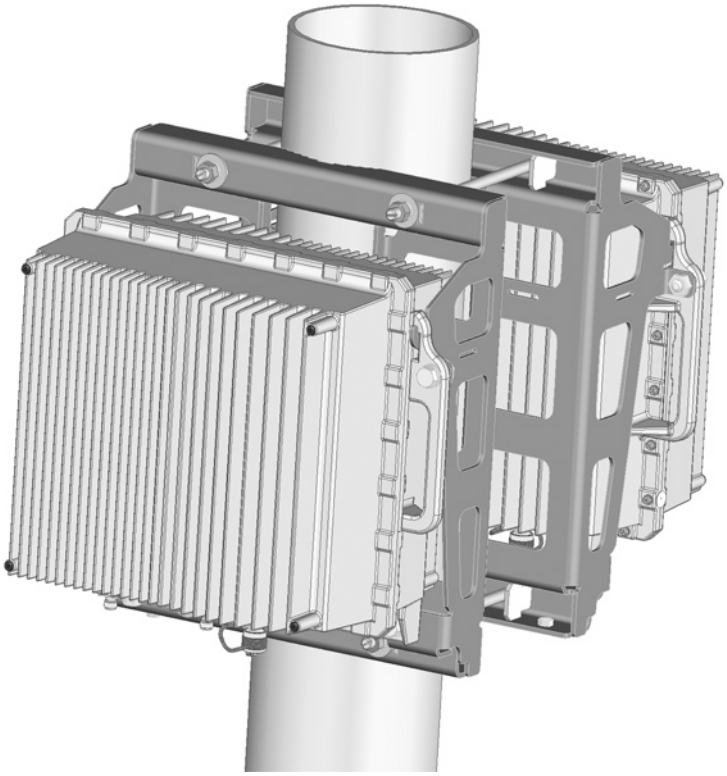


**Figure 2-10: Two ODUs Mounted on the Pole**

## 2.1.4.8 Mounting the Sun Guard

**CAUTION**

To avoid damage to the Sun Guard, assemble it after the ODUs are mounted on the pole.

1 Attach the Sun Guard to the front of the ODU using the four M6x16 screws supplied with the Sun Guard.

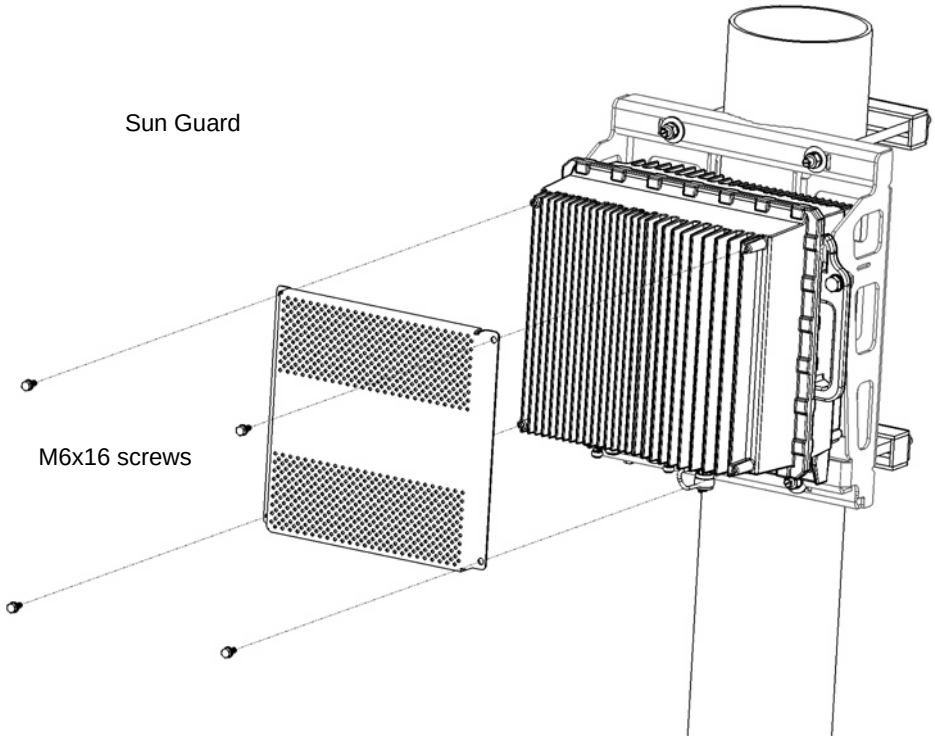



**Figure 2-11: Attaching the Sun Guard to the 4x2 ODU**

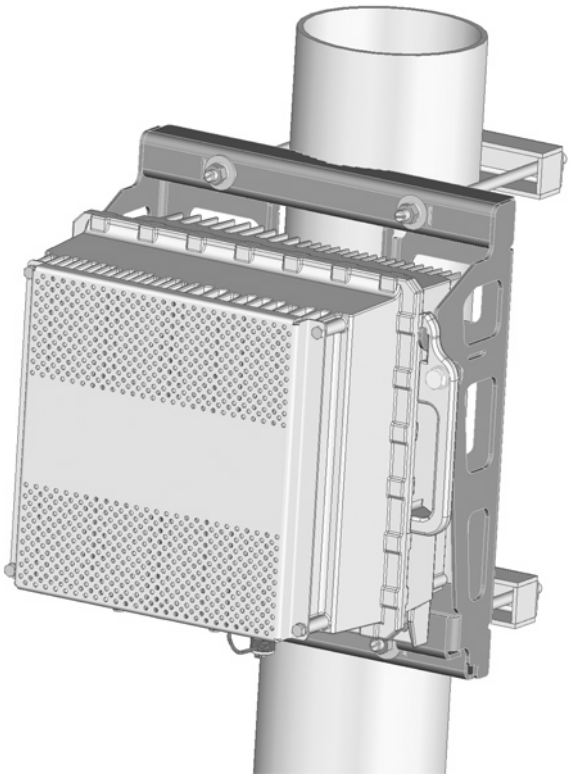


**Figure 2-12: 4x2 ODU with Sun Guard**

## 2.1.4.9 4x2 ODU Connectors and LEDs

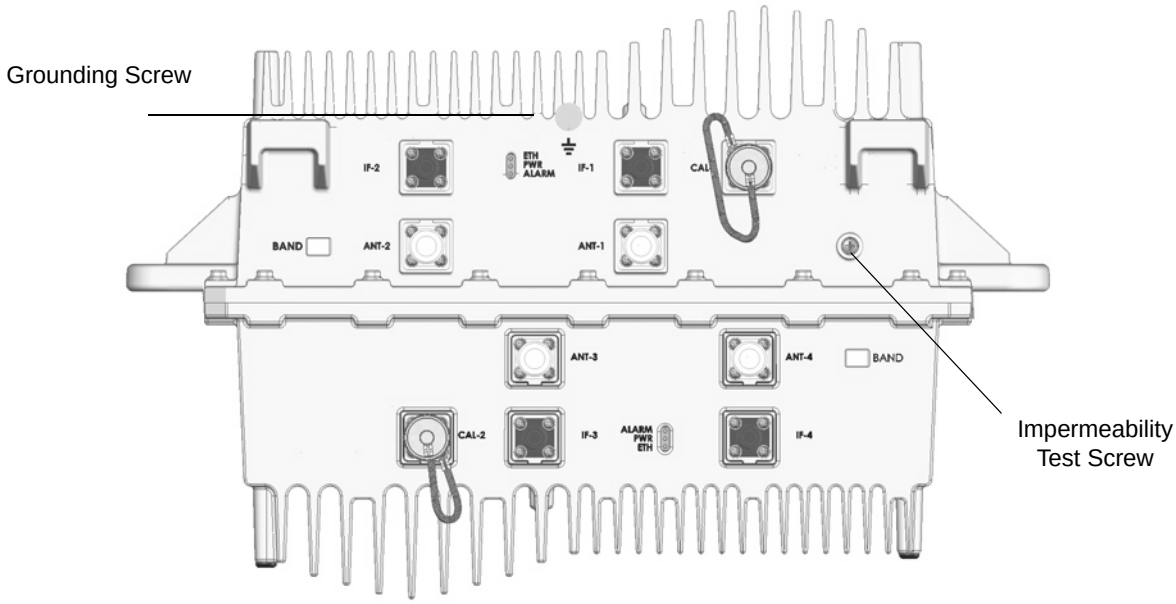



**Figure 2-13: Bottom Panel of 4x2 ODU**

**CAUTION**

Do not open the impermeability test screw - you may impair the sealing of the unit against moisture and humidity.

**Table 2-5: 4x1 ODU LEDs**

| Name | Description | Functionality |
|---|---|---|
| PWR | Power indication | ■ Off - Power failure<br>■ Green - Power to ODU is OK, internal 3.3 VDC power supply is OK. |
| ALARM | AU-ODU communication and synthesizer status indication | ■ Off - AU-ODU communication is OK, synthesizer is locked.<br>■ Red - AU-ODU communication failure or synthesizer is not locked |
| ETH | Wireless Link Traffic | Green when there is traffic on the wireless link |

**Table 2-6: 4x1 ODU Connectors**

| Name | Connector | Functionality |
|---|---|---|
| IF-1 to IF-4 | 4 x TNC jack | Connection to the AU/ODU Power Feeder |
| ANT-1 to ANT-4 | 4 x N-Type jack, 50 Ohm | Connection to an external antenna |
| ⏚ (GND) | Grounding screw | Connection to ground (earth) |
| CAL-1, CAL-1 | | Not used in current release |

## 2.1.5 Connecting the Cables

### 2.1.5.1 Connecting the Grounding Cable

The Grounding screw (marked ⏚ ) is located on the bottom panel of the outdoor unit.

**To connect the grounding cable:**

1. Connect one end of a grounding cable to the grounding screw and tighten the grounding screw firmly.
2. Connect the other end of the grounding cable to a good ground (earth) connection.

### 2.1.5.2 Connecting the Antenna Cable

**To connect the RF cable:**

1. Connect one end of the coaxial RF cable to the RF (ANT) connector located on the bottom panel of the unit.
2. Connect the other end of the RF cable to the antenna.
3. The RF connectors should be properly sealed to protect against rain and moisture.

### 2.1.5.3 Connecting the IF Cable

**To connect the IF cable:**

1. Connect one end of the coaxial IF cable to the IF connector located on the bottom panel of the unit.
2. Verify that the length of the IF cable is sufficient to reach the AU/Power Feeder. See IF cable length limitation in Section 2.1.2.
3. The IF cable connector should be properly sealed to protect against rain and moisture.
4. Route the cable to the location selected for the indoor equipment.

# 2.2 Installing the Antennas

This section provides general guidelines on installation of antennas and necessary accessories provided by Alvarion.

## 2.2.1 Guidelines for Positioning the Antennas

This section provides key guidelines for selecting the optimal installation locations for the antennas.

**CAUTION**

ONLY experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities should install outdoor units and antennas.

Failure to do so may void the BreezeMAX product warranty and may expose the end user or Service Provider to legal and financial liabilities. Alvarion and its resellers or distributors are not liable for injury, damage or regulation violations associated with the installation of Outdoor Units or antennas.

Select the optimal locations for the equipment using the following guidelines:

- The antennas are pole or wall mounted. Their location should enable easy access to the unit for installation and testing.
- The higher the placement of the antenna, the better the achievable link quality.
- The antenna should be installed so as to provide coverage to the intended service area.

**NOTE**

The recommended minimum distance between any two antennas in neighboring sectors is 0.5 meters.

- The antenna should be installed as close as possible to the ODU.

## 2.2.2 Antenna Installation Requirements

The following equipment is required to complete installation of the antennas, including all equipment required for controlling the electronic downtilt of the antennas (RET):

- Antennas, including mounting kit (fixed and adjustable downtilt).
- Remote Cable Outdoor Termination Unit (3 Way AISG Breakout Box): One for up to 3 antennas, 2 for 4 to 6 antennas.
- Long AISG Remote Cable (available in length of 60 or 80 meter).
- Remote Cable Termination Panel.
- Short AISG Remote Cables (available in length of 2, 3 or 5 meter according to the distance of the Remote Cable Outdoor Termination Unit from the antennas): One for each antenna. An additional cable is required if two Remote Cable Outdoor Termination Units are used.
- Remote Downtilt Control Kit.
- RF cables for connecting the antenna to the ODU(s).

## 2.2.3 Recommended Installation Procedure

### 2.2.3.1 Pre-Installation

1. Connect the AISG Antenna Controller to each antenna to verify that it functions properly. Check the address of each antenna and note it together with its planned location (azymuth) for future reference. Note that an XX antenna (4 ports antenna) has two bands, each with its own RET adjustment. For details on using the AISG Antenna Controller refer to the documentation supplied with it. Return the electronic downtilt to 0 degrees to ensure that the indicator will not be damaged during installation.
2. Prepare the short AISG Remote Cables and connect them to the Remote Cable Outdoor Termination Unit(s). If two Remote Cable Outdoor Termination Units should be installed, prepare and connect also the cable interconnecting the two units. Refer to the instruction supplied with the unit. Connect the antennas and use the AISG Antenna Controller to verify proper operation. Disconnect the antennas and Controller (and interconnecting cable if used).

### 2.2.3.2 Installation

1. Install the Remote Cable Termination Panel in a 19” rack. Its placement should enable easy connection of the AISG Antenna Controller.

2 Install the antennas according to the planned azymuth. It is recommended to use the Adjustable Downtilt Kit and set it at 0 degrees downtilt. Refer to the installation instructions supplied with the antennas.

3 Install the Remote Cable Outdoor Termination Unit(s) according to the instructions supplied with the unit. The placement of the unit(s) should enable connection of all the AISG Remote Cables to the antennas. Connect all the cables to the antennas. If needed, connect the two units using the pre-prepared cable.

4 Connect the long AISG Remote Cable to the Remote Cable Outdoor Termination Unit and route it to the location of the Remote Cable Termination Panel. Connect it to the Panel according to the instructions supplied with the Panel.

5 Connect the AISG Antenna Controller to the Remote Cable Termination Panel and set to downtilt of each antenna to the desired angle. For recommendation on typical downtilt required in various scenarios refer to “Antenna Down-Tilt Guidelines” on page 820.

# 2.3 Installing the Base Transceiver Station (BTS) Equipment

## 2.3.1 BTS Installation Requirements

### 2.3.1.1 Packing List

- BTS Chassis:
  - » Base Transceiver Station Chassis
  - » AVU Air Ventilation Unit (installed)
  - » Cables Tray kit
- PIU (1 or 2 per chassis) High-Power Interface Unit(s). A suitable DC power cable is supplied with each PIU.
- PSU (up to 4 per chassis) Power Supply Unit(s)
- NPU Network Processing Unit and Monitor cable
- AU-4CH Access Unit Indoor Unit(s) as required for specific configuration

### 2.3.1.2 Additional Installation Requirements

The following items are also required to install the BTS:

- Ethernet cable (straight) for connecting the NPU to a Hub/Switch.

**NOTE**

The maximum length of the Ethernet cable is 100m when operating at 100 Mbps and 70m when operating at 1 Gbps.

- A grounding cable with appropriate terminations for connecting the chassis to the rack or another ground (earth) connection.
- For installation in a 21" ETSI rack: Two 21" ETSI rack adapters
- A portable PC for configuring parameters using the Monitor cable (supplied with the NPU)

- Other installation tools and materials

## 2.3.2 BTS Chassis Slot Assignments

The BTS chassis comprises 6 3U high slots and 9 6U high slots, as shown in Figure 2-14.

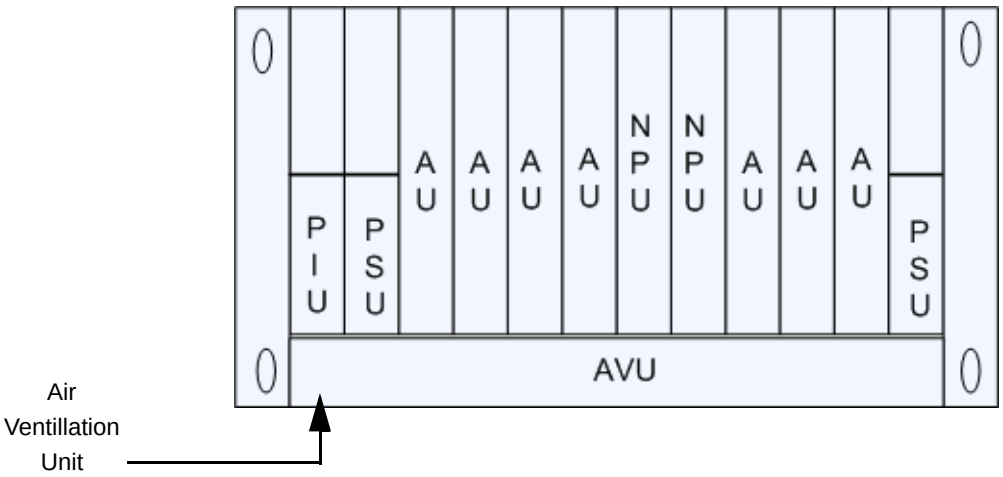



**Figure 2-14: BTS Chassis Slot Assignments**

The Cable Tray (the installation kit is supplied with the chassis) should be installed on the top of the chassis front to enable convenient routing of cables connecting to power source(s), outdoor unit(s) and other equipment.

To enable power source and/or Power Interface Unit 1+1 redundancy, two PIU modules can be installed in the designated slots. If a single PIU module is used, it can be inserted into either one of the two designated slots.

The number of installed PSU modules depends on the specific configuration (number of AUs) and NPU redundancy scheme (refer to Table 2-9). If less than 4 PSU modules are used, they can be installed in any of the designated slots.

The NPU should be installed in slot number 5 (slot numbers are marked on the Cable Guide). Slot 6 is reserved for a future redundant NPU.

Slots 1-4 and 7-9 can hold up to seven AU modules (only six AUs can be active).

Unused slots should remain covered until required.

## 2.3.3 Power Requirements

Use the following table to calculate worst-case power source requirements for the BTS equipment:

**Table 2-7: Power Requirements, BTS Equipment**

| Unit | Details |
|---|---|
| Power Source | -40.5 to -60 VDC |
| PIU | Power Consumption: 35W maximum (active PIU)<br>Maximum Supplied Current: 58 A |
| PSU | 300W max output power<br>Efficiency: 80% minimum |
| NPU | 68W maximum, excluding GPS Receiver (6W maximum) |
| AU-4CH | 46W maximum |
| ODU-2.x GHz | Tx (DL): 89W maximum<br>Rx (UL): 15W maximum |
| ODU-3.x GHz | Tx (DL): 90W maximum<br>Rx (UL): 20W maximum |
| AVU | 40W maximum, 23W typical |
| Outdoor GPS Receiver | 6W maximum |

**NOTE**

The PSU(s) do not supply power to the ODUs that are powered directly from the PIU via the backplane and the AU cards. The PIU can support up to a maximum of 20 1x1 ODUs. Additional ODUs should be powered from ODU Power Feeders (not applicable for current release).

**Power Calculation Example**:

Configuration: A 2.x GHz BTS with 3 AU cards and 4 1x1 ODUs connected to each AU. Uplink-Downlink split (allocation ratio) of 12-34.

Maximum power consumption that should be supplied by PSUs:

NPU: 68W

3 AUs: 3*46=138W

AVU: 40W

GPS Receiver: 6w

Total maximum power supplied by PSUs: 252W

Total maximum power required excluding ODUs: 252/0.8 (PSUs Efficiency) + 35 (PIU) = 350W

When calculating the power requirements associated with the ODUs, we should distinguish between the peak power consumption (maximum current during Tx) and the average power consumption (taking into account Tx/Rx split ratio) that affect the requirements from a backup power source.

For a 2.x GHz system, the peak power consumption of 12 ODUs under worst conditions is 12*89 = 1068W. Thus, the maximum peak power of the system is 350 + 1068 = 1418W (35A @ -40.5 VDC).

The maximum average power consumption of each ODU, assuming UL-DL (Rx/Tx) ratio of 12-34 is (15*12+89*34)/46 = 70W. Thus, the maximum average power required for the whole system is 350 + 70*12 = 1190W (29.4A @ -40.5 VDC).

### 2.3.4 HOT SWAP Support

The NPU, AU, and PIU modules includes a blue HOT SWAP LED and a micro-switch in the injector/ejector handle to support hot-swap control. After releasing the ejector's button, the HOT SWAP LED should turn on, indicating that power to/from the back-panel is disconnected and the module can be removed safely.

### 2.3.5 Power Interface Unit (PIU)

The single Euro PIU module serves as the interface between the BTS site's DC power source and the BTS Chassis Power Supply Units and external ODUs, which receive power via the IDUs.

The PIU filters and stabilizes the BTS input power and protects the system from power problems such as over voltage, surge pulses, reverse polarity connection and short circuits. It also filters high frequency interference (radiated emissions) and low frequency interference (conducted emissions) to the external power source. Each BTS chassis contains two slots for an optional 1+1 PIU redundancy. One PIU is sufficient to support a fully populated chassis. Two PIU modules provide redundant power feeding (two input sources) while avoiding current flow between the two input sources.

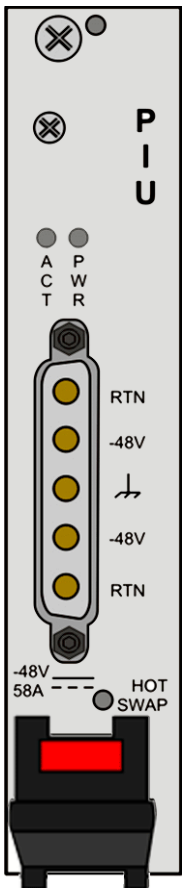



**Figure 2-15: PIU Module Front Panel**

**CAUTION**

When replacing a PIU, disconnect power from the PIU module before inserting/ejecting it to/from the chassis. After disconnecting from power, disconnect the power cable to avoid irreversible damage due to potential excessively high transient current. Connect power to the PIU only after it is fully inserted into the chassis.

**Table 2-8: PIU LEDs**

| PWR and MASTER/ACT LEDs | | PIU Status |
|---|---|---|
| **PWR** | **MASTER/ ACT** | |
| Off | Off | Chassis is not connected to power |
| Red | Off | Power input is out of range or PIU card is damaged. Chassis is powered by the redundant PIU |

**Table 2-8: PIU LEDs**

| PWR and MASTER/ACT LEDs | | PIU Status |
|---|---|---|
| Red | Green | Power input is out of range or PIU card is damaged. Chassis is powered by the PIU |
| Green | Off | Power to PIU is OK. PIU is in redundant mode and the chassis is powered from the other PIU |
| Green | Green | Power to PIU is OK. The chassis is powered from the PIU. |
| **HOT SWAP LED** | | **Off:** Power from the module to the chassis is not disconnected, the PIU is not ready for removal<br><br>**Blue:** Power from the module to the chassis can be disconnected and the PIU can be safely removed |

### 2.3.5.1 Preparing a Power Cable for the PIU

A 2.5m DC power cable is supplied with each chassis. Additional DC cables can be ordered from Alvarion. If necessary, use the following instruction to prepare a DC cable.

**To prepare the power cable:**

1. For a cable length up to 2.5m use a cable with 4 x 10AWG (or thicker) wires for the power plus and an additional 10AWG (or thicker) ground wire. For a longer cable (up to 10m), use a cable with 4 x 8AWG (or thicker) wires for the power plus and an additional 10AWG (or thicker) ground wire.
2. The matching power connector to be used is D-SUB 5W5S Female with power pins 40A.
3. Connect the cable to the power connector as follows:
   - Pin 1 (RTN): Red (10/8 AWG min wire)
   - Pin 2 (-48V): Black (10/8 AWG min wire)
   - Pin 3 ( ⏚ ): Ground (shield), Green/Yellow (10AWG min wire)
   - Pin 4 (-48V): Black (10/8 AWG min wire)
   - Pin 5 (RTN): Red (10/8 AWG min wire)
4. Attach suitable terminal rings to the side that connects to the power source.

**CAUTION**

It is strongly recommended to always use the power cables available from Alvarion.

Due to the high current that should be supported by the cable, good workmanship is esstential in preparing it.

## 2.3.6 Power Supply Unit (PSU)

The single Euro PSU module is a 48 VDC power supply unit. Each BTS chassis can contain up to four PSU modules providing N+1 redundancy configurations.

The following table displays the number of PSU modules (excluding redundant units) required for various BTS configurations:

**Table 2-9: PSU Requirements, Configurations with one NPU (excluding PSU redundancy)**

| Number of AUs | Minimum Required Number of PSUs |
|---|---|
| 1 - 4 | 2 |
| 5 - 6 | 3 |

**NOTE**

The PSU(s) do not supply power to the ODUs. ODUsare powered directly from the power source via the PIU and the back plane.

**Figure 2-16: PSU Module Front Panel**

**Table 2-10: PSU LEDs**

| LED Status | | Description |
|---|---|---|
| **PWR** | **ALRM** | |
| Off | Off | No power or fatal damage |
| Off | Red | Power input is out of range or PSU is damaged or PSU is inhibited by NPU |
| Green | Off | Power is OK and PSU operates properly |

## 2.3.7 Access Unit Module (AU)

The double Euro Access Unit IDU module contains the wireless MAC and modem that enable the establishment of wireless network connection and bandwidth management. Each AU includes four PHY channels that can be connected to ODUs.

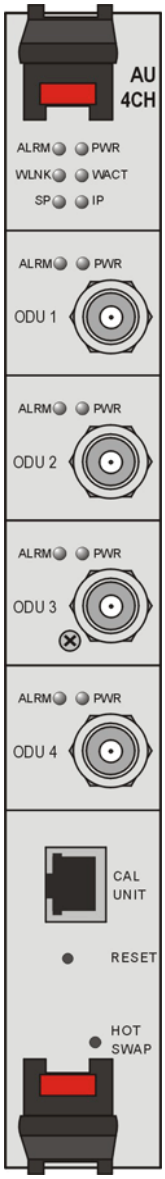



**Figure 2-17: AU Module Front Panel**

**Table 2-11: AU LEDs**

| Name | Description | Function |
|---|---|---|
| PWR | Power indication | ■ Off - AU is not powered<br>■ Red - AU power supply failure (low power)<br>■ Green - AU power is OK |
| ALRM | Alarm indication | ■ Off - AU is OK<br>■ Red - AU failure |
| WLINK | Wireless link status indication | ■ Off - No MS is associated<br>■ Green - At least one MS is associated |
| WACT | Transmission indication | ■ Off - No transmission<br>■ Green - Transmission OK |
| SP | Spare | Not Used |
| IP | IP activity indication | ■ Off - No IP activity<br>■ Green (blinking) - IP activity |
| ODU1 - ODU4 PWR | AU to ODU Power Indication | ■ Off - No AU to ODU power output<br>■ Red - AU to ODU power output failure<br>■ Green - AU to ODU power output OK |
| ODU1 -ODU4 ALRM | AU to ODU communication status | ■ Off - AU-ODU communication OK<br>■ Red - AU-ODU communication failure |
| HOT SWAP | AU readiness for hot swap removal | ■ Off: Power to the module is not disconnected, the AU is not ready for removal<br>■ Blue: Power to the module can be disconnected and the AU can be safely removed. |

## 2.3.8 Network Processing Unit (NPU)

The NPU module serves as the central processing unit that manages the BTS's components and the SUs served by it. It also aggregates the traffic from the AU modules and transfers it to the IP backbone through a dedicated Gigabit/Fast Ethernet interface. In addition, the NPU can be operated in ASN-GW mode, in which case it also implements ASN-GW functionality.

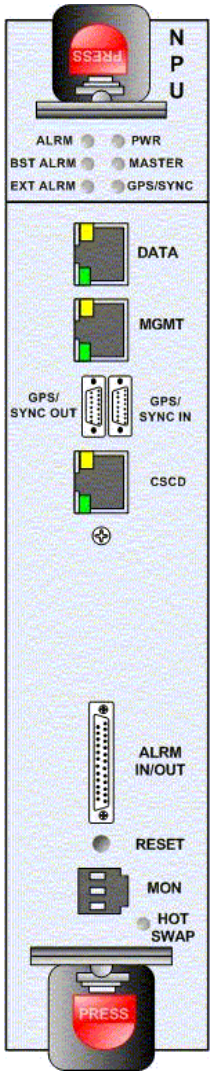



**Figure 2-18: NPU Module Front Panel**

**Table 2-12: NPU LEDS**

| Name | Description | Function |
|---|---|---|
| MGMT Port Activity LED | MGMT Port Activity LED | ■ When **blinking yellow** indicates Ethernet activity at the management port |
| MGMT Port Integrity LED | MGMT Port Integrity LED | ■ When **lit green** indicates Ethernet physical layer is OK |
| DATA Port Activity LED | DATA Port Activity LED | ■ When **blinking yellow** indicates Ethernet activity at the data port |
| MGMT Port Integrity LED | MGMT Port Integrity LED | ■ When **lit green** indicates Ethernet physical layer is OK |
| EXT ALRM | External alarm indication | ■ Off - No alarm<br>■ Red - Alarm received via the ALRM IN connector |
| BST ALRM | Cell site component failure indication | ■ Off - All 4Motion modules are OK<br>■ Red - Failure in one (or more) 4Motion modules<br>■ Blinking - During powering up of NPU |
| ALRM | NPU card failure indication | ■ Off - NPU is OK<br>■ Red - NPU failure<br>■ Blinking - During powering up of NPU |
| PWR | Power indication | ■ Off - NPU is not powered<br>■ Red - NPU power failure<br>■ Green - NPU power is OK |
| Master | Master indication | ■ Lits when NPU is primary |
| GPS/SYNC | GPS/IF clock syncronization function indication | ■ Off - NPU clock is not synchronized to external source<br>■ Green - NPU clock is synchronized to external source |

**Table 2-12: NPU LEDS**

| Name | Description | Function |
|---|---|---|
| Hot Swap | NPU readiness | **NPU card insertion status indicator**<br>■ Off: Card is inserted correctly into the chassis<br>■ Blue: Card insertion is in progress or is not inserted successfully<br>**NPU card ejection status indicator**<br>■ Off: Power to the module is not disconnected, the NPU is not ready for removal<br>■ Blue: Power to the module can be disconnected and the NPU can be safely removed. |

**Table 2-13: NPU Connectors**

| Name | Description | Function |
|---|---|---|
| Data | RJ-45 connector | ■ Used to connect the NPU to the backbone<br>■ Cable connection to a hub/switch/router: Straight |
| MGMT | RL-45 connector | ■ Connection to out-of-band management<br>■ Cable connection to a PC: Crossed<br>■ Cable connection to a hub/switch/router: Straight |
| GP/SYNC IN | GPS/SYNC IN connector | ■ Enables connection to a GPS Receiver |
| GP/SYNC OUT | GPS/SYNC OUT connector | ■ Supply of synchronization signals to another unit (for future use) |
| ALRM IN/OUT | ALARM IN/OUT connector | ■ Connection to external alarms |
| Cascade | RJ-45 with two embedded LEDs | ■ Connection to cascade shelf<br>■ Cable connection to local management traffic<br>■ Cable connection to cascade shelf: Crossed |
| MON | MON connector | ■ 3-pin low profile connector used for accessing the NPU through the serial command line interface |
| RESET | RESET Button | ■ Used to perform hardware rest to the NPU |

## 2.3.9 Connecting the BTS Chassis and Modules

The indoor equipment should be installed as close as possible to the location where the IF cable(s) enters the building. The location of the indoor equipment should take into account its connection to the power source(s) and to the BTS networking equipment.

### 2.3.9.1 Introduction

The BTS modules include special handles for high-force insertion/extraction of modules. Each of the 6U high modules (NPU, AU) includes two such handles, whereas each of the 3U high-modules (PIU, PSU) includes a single handle at the bottom of the front panel.

The bottom injector/ejector handle of the NPU and AU modules includes a micro-switch to support hot-swap control. Second generation PIU modules also support hot-swap, as indicated by the HOT SWAP blue LED.

**To connect the BTS chassis and modules:**

1. Attach the Cable Guide to the top panel of the chassis using the screws and washers supplied with the Cable Guide.
2. Install the chassis in a 19" cabinet. For installation in a 21" cabinet, attach suitable ETSI rack adapters to the chassis. To provide a sufficient space for the Cable Guide and to allow air flow for preventing over-heating, leave a free space of at least 1U between the upper covers of the chassis and other units in the cabinet.
3. Connect one end of a grounding cable to the ground terminal located on the rear panel of the chassis and firmly tighten the grounding screw. Connect the opposite end of the grounding cable to a ground connection or to the cabinet, if applicable.
4. Carefully insert the modules into the relevant slots. Secure the modules in their alloted locations.
5. Place blank covers over all unused slots.
6. Connect the DATA port of the NPU to the backbone data equipment (use a straight Ethernet cable to connect to a hub/switch/router). The maximum length of the Ethernet cable is 100m when operating at 100 Mbps and 70m when operating at 1 Gbps.

7 If the MGMT port is used for remote management, connect it to the appropriate data equipment (use a straight Ethernet cable to connect to a hub/switch/router). The maximum length of the Ethernet cable is 100m.

8 Connect the DC power cable to the power jack of the PIU module. If a redundant PIU is installed, connect a DC power cable also to the second PIU module. Connect the power cord(s) to the -48 VDC power source(s), as follows.

- Black wire to the 48 VDC contact of the power source.
- Red wire to the + (Return) contact.
- Ground wire to the ground.

### 2.3.9.2 Air Ventilation Unit (AVU)

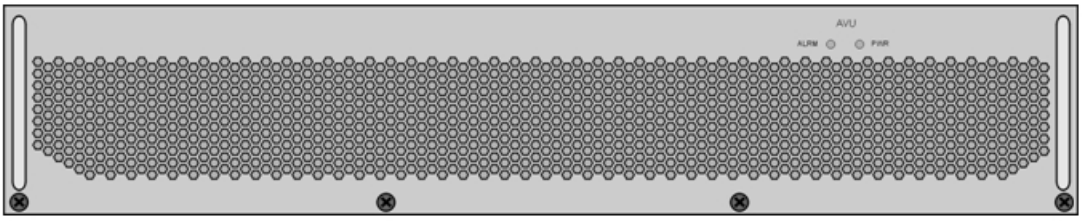



**Figure 2-19: AVU Drawer Front Panel**

The 2U high, 84 HP wide AVU includes a 1U high integral chamber for inlet airflow and a 1U high fan tray with an internal alarm module. To support a high availability BTS, the fan tray includes 10 brush-less fans, where 9 fans are sufficient for cooling a fully loaded chassis. To further support high availability, the chassis can operate with the hot-swappable fan tray extracted from it for a period of time sufficient for replacing it (up to 10 minutes).

**Table 2-14: AVU LEDs**

| LED Status | | Description |
|---|---|---|
| **PWR** | **ALRM** | |
| Off | Off | No 5V power input |
| Red | Red | 12V power failed |
| Green | Red | One or more fans have failed |
| Green | Off | AVU operates properly |

If the red ALRM LED is on while the PWR LED is green, it indicates a failure of at least one fan. Although the BTS chassis may continue operating with one failed fan, it is recommended to replace the AVU as soon as possible.

## 2.3.10 Replacing BTS Components

### 2.3.10.1 Replacing an AVU

**To replace an AVU drawer:**

Release the four screws securing the AVU to the chassis.

Using the handle take out the faulty chassis.

Insert a new AVU drawer and tighten the screws.

### 2.3.10.2 Replacing an NPU

To minimize downtime and facilitate fast and easy NPU replacement, it is recommended to maintain an updated copy of the NPU configuration. Refer to Section 4.3.4 for details on preparing and uploading a backup file of the NPU configuration.

1. Release the screws located on the top and bottom of the NPU's front panel.
2. Press the red button of both handles until they are unlocked.
3. Wait until the blue HOT SWAP LED turns on, indicating that the module has been disconnected and can be removed.
4. Press the upper handle up and the lower handle down until the module is unlocked. Firmly hold both handles and take the module out of the chassis.
5. Disconnect all IF cables connecting the AUs to the ODUs. This is necessary as the initial configuration of the new NPU is most probably inappropriate.
6. Firmly push the new NPU module into its intended slot (slot 5).
7. Press the upper handle up and the lower handle down simultaneously until you hear the locking click and the red buttons are released. The blue HOT SWAP LED will briefly turn on, indicating that the module is being powered up.
8. Secure the module in place by tightening the screws located on the top and bottom of the front panel.

9 Download the backup file using a DOS based TFTP. Use the command: *tftp i <NPU port IP address> put <file name>*. The default IP address of the MGMT port is 10.0.0.1.

10 Use the monitor program to configure the IP parameters (IP address, Subnet Mask, Default Gateway Address) of the MGMT port. These parameters are not affected by the loaded file.

11 Reset the system.

12 Reconnect the IF cables.

### 2.3.10.3 Replacing an AU

1 Disconnect all IF cables connecting the AUs to ODUs.

2 Release the screws at the top and the bottom of the AU's front panel.

3 Press the red button of both handles until they are unlocked.

4 Wait until the blue HOT SWAP LED turns on, indicating that the module has been disconnected and can be removed.

5 Press the upper handle up and the lower handle down until the module is unlocked. Firmly hold both handles and take the module out of the chassis.

6 Firmly push the new AU module into its intended slot.

7 Press the upper handle up and the lower handle down simultaneously until you hear the locking click and the red buttons are released. The blue HOT SWAP LED will briefly turn on, indicating that the module is being powered up.

8 Secure the module in place by tightening the screws located on the top and bottom of the front panel.

9 Reconnect the IF cables. Make sure that each ODU is connected to the appropriate port on the AU.

10 Wait until the AU reboot process is completed. This might take few minutes.

11 Reset the AU. (To perform the reset go to the main menu of the AU, select *2 - Unit Control*, than select *1 - Reset* and confirm the reset. Alternatively, you can press the reset button on the front panel of the AU).

12 Go to the AU main menu and check that the SW version and all parameters are as required.

13 Check that the AU operates properly, and the SUs to which service is offered are connected to the AU.

### 2.3.10.4 Replacing a PIU

1 Release the screws located on the top and bottom of the PIU's front panel.

2 Press the handle's red button until the handle is unlocked.

3 Wait until the blue HOT SWAP LED turns on, indicating that the module has been disconnected and can be removed.

4 Disconnect the power cable from the PIU

5 Press the handle up until the module is unlocked. Firmly hold the handle and take the module out of the chassis.

6 Firmly push the new PIU module into its intended slot.

7 Press the handle down until you hear the locking click and the red buttons are released.

8 Secure the module in place by tightening the screws located on the top and bottom of the front panel.

9 Connect power to the PIU only after it is fully inserted into the chassis.

# 2.4 Installing the ODU Power Feeder

## 2.4.1 Installation Requirements

### 2.4.1.1 Packing List

- A 19” panel can hold up to three ODU Power Feeder modules.
- ODU Power Feeder module, including a DC power cable, four 0.5 meter IF cables and four screws.

### 2.4.1.2 Additional Installation Requirements

- A grounding cable with appropriate terminations for connecting the unit's ground terminal to the rack or to a ground connection.
- Other installation tools and materials

## 2.4.2 The ODU Power Feeder

The ODU Power Feeder is used to provide power (-48 VDC) to the ODUs. It transfers all signals transparently between the AU and the ODU, while injecting DC power received from an external source. Each ODU Power Feeder unit can serve up to four ODUs. Up to three ODU Power Feeder units can be installed in a 1U Feeder panel.

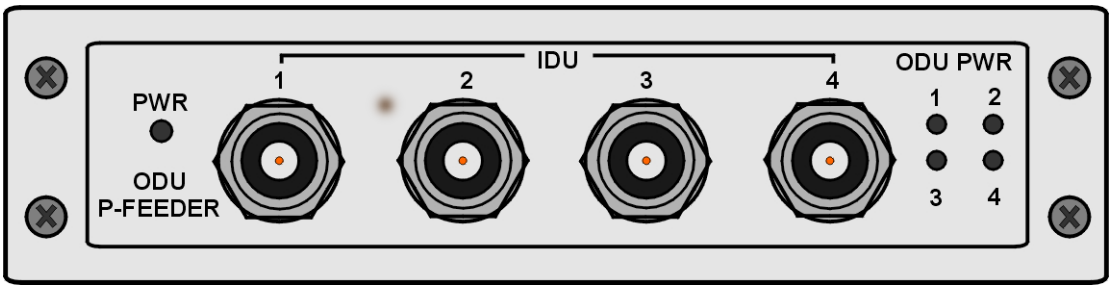



**Figure 2-20: ODU Power Feeder Front Panel**

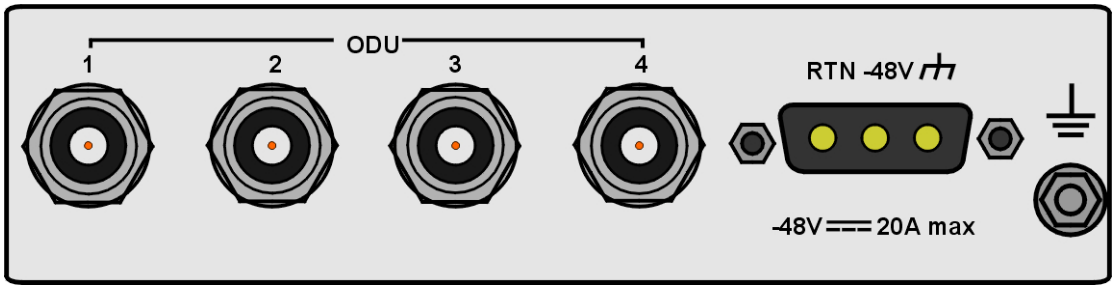



**Figure 2-21: ODU Power Feeder Rear Panel**

**Table 2-15: ODU Power Feeder Connectors**

| Name | Connector | Functional |
|---|---|---|
| IDU 1 - 4 | 4 x TNC jacks | Connection to ODU connectors of AUs |
| ODU 1 - 4 | 4 x TNC jacks | Connections to IF connectors of ODU units |
| -48V | 3-pin D-Type power jack | Connection to DC power source |
| ⏚ (GND) | Grounding Screw | Connection to ground (earth) |

**Table 2-16: ODU Power Feeder LEDs**

| Name | Description | Functionality |
|---|---|---|
| PWR | Input power indication | ■ Off - ODU Power Feeder is not powered<br>■ Green - ODU Power Feeder power is OK |
| ODU PWR 1 - 4 | Output power indications | ■ Off - ODU is not connected<br>■ Red - Power output problem (short or overload)<br>■ Green - ODU is connected and powered |

### 2.4.2.1 Preparing a Power Cable

A 2.5m DC power cable is supplied with each ODU Power Feeder module. Additional DC cables can be ordered from Alvarion. If necessary, use the following instruction to prepare a DC cable.

**To prepare the power cable:**

1. Use a cable capable of supporting a current of at least 10A. Use a cable with 2 x 10AWG (or thicker) wires for the power plus an additional 10AWG to 20AWG ground wire.
2. The matching power connector to be used is Amphenol D-type power P/N 177TWA/3W3/SP3Y with high power socket contacts P/N 17DM53744-1.
3. Connect the cable to the power connector as follows:
   - Pin 1 (RTN): Red (10 AWG min wire)
   - Pin 2 (-48V): Black (10 AWG min wire)
   - Pin 3 ( ⏚ ): Ground (shield) (10AWG-20AWG wire)
4. Attach suitable terminal rings to the side that connects to the power source.

## 2.4.3 Installing the ODU Power Feeder

The ODU Power Feeder should be installed as close as possible to the location where the IF cable(s) enters the building. The location of the ODU Power Feeder should take into consideration its connection to the power source and to the BTS equipment.

**To install the ODU Power Feeder:**

1. The panel is supplied with blank covers. Release the nuts on the rear side of the panels to remove the blank cover(s) you want to replace with ODU Power Feeder module(s). Attach the ODU Power Feeder module(s) to the panel using the four screws supplied with each module.
2. Place the panel with the ODU Power Feeder module(s) on a shelf/desk or install it in a 19" cabinet, next to the BTS equipment.
3. Connect one end of a grounding cable to the grounding screw located on the rear panel of each ODU Power Feeder module and firmly tighten the grounding screw. Connect the other end of the grounding cable(s) to a ground (earth) connection or to the cabinet, if applicable.
4. Connect the IDU connector(s) to the appropriate ODU connector(s) of the AU(s) using the short (0.5 meter) IF cables supplied with the module.
5. Connect the power cord to the ODU Power Feeder's DC socket, located on the rear panel. Connect the other end of the power cord to the -48 VDC power source.
6. Connect the IF cable(s) to the appropriate ODU connector(s).The other end is already connected connected to the ODU(s). To avoid transmissions at undesired frequencies, verify that the frequency and bandwidth parameters are properly configured before connecting the IF cables.

# 2.5 Installing the Outdoor GPS Receiver

Perform the following steps to install the Outdoor GPS Receiver

1. Place the bracket on a flat surface and thread the supplied pipe through the bracket hole and into the GPS antenna. Hand-tighten until snug. Do not over-tighten or use a tool. Make sure that the connector (male) is on the open side of the bracket.
2. Assemble the surge protection cable onto the bracket using the supplied screws, washers, and spring washers (2x1032). Apply torque 2.1 [N*m] (19.2 [lbs*in]). Make sure that the female connector faces the antenna.
3. Use a 1032 screw, washer, and spring washer to connect the surge protector's grounding cable to the bracket. Apply torque 2.1 [N*m] (19.2 [lbs*in]).
4. Connect the surge protector cable (female connector) to the GPS antenna connector (male). Use the groove on the cable connector (indicatd by an arrow) as a guide. It aligns with the tenon in the connector on the GPS side. Turn the locking ring on the cable connector clockwise to secure the connection. Do not over-tighten.
5. Use the supplied clamps to assemble the GPS and bracket on a pole. Use the M8 nuts, washers, and spring washers to lock the clamps to the bracket. Apply torque 9 [N*m] (80 [lbs*in]).

# 2.6 Connecting the GPS Cables

The Outdoor GPS Receiver is connected to the GPS/SYNC IN connector. Before connecting the cable, make sure that the length of the cable is sufficient to reach the NPU.

**To connect the Ethernet cable:**

1. Connect the 12-pin round connector (female) of the Cat. 5E Ethernet cable to the male connector of the surge protector. Use the groove on the cable connector (indicated by an arrow) as a guide. It aligns with the tenon in the connector on the surge protector side. Turn the locking ring on the cable connector clockwise to secure the connection. Do not over-tighten.
2. Fix the cable onto the pole using a cable strip. Route the cable to the location selected for the indoor equipment.
3. Crimp the other end of the Cat. 5E Ethernet cable with an RJ-45 connector and connect it to the indoor GPS adapter cable. Connect the other end of the indoor GPS adapter cable to GPS/SYNC IN connector.

3

# Chapter 3 - Commissioning

## In This Chapter:


- "Initial NPU Configuration" on page 90
- "Completing the Site Configuration Using AlvariSTAR" on page 94

# 3.1 Initial NPU Configuration

## 3.1.1 Introduction

After completing the installation process, as described in the preceding chapter, some basic NPU parameters must be configured locally using the CLI via the MON port of the NPU.

Refer to Chapter 4 for information on how to access the CLI either via the MON port or via Telnet and how to use it.

The following sections describe the minimum mandatory configuration actions required to allow remote configuration of the site and to enable discovery by the EMS system:

1 ”NPU Local Connectivity”

2 ”Site Connectivity”

3 ”ACL Definition”

4 ”Static Route Definition”

5 ”SNMP Manager Definition”

6 ”Site ID Definition”

## 3.1.2 NPU Local Connectivity

Refer to “Accessing the CLI from a Local Terminal” on page 109 for details on connecting locally to the NPU.

Clear existing site configuration (must be executed for "used” NPUs): Restore to factory default and reboot using the following command:

npu# restore-factory-default

## 3.1.3 Site Connectivity

### 3.1.3.1 Connectivity Mode

The connectivity mode determines how traffic is to be routed between the NPU and the BSs, AAA server and external Management System servers.

The default connectivity mode is In-Band (IB) via the Data port. Alternatively, the NPU can be managed Out-Of-Band (OOB) via the dedicated Management port.

To view the current and configured connectivity mode, use the command:
npu# show connectivity mode

To change the connectivity mode to Out-Of-Band, use the command:
npu(config)# connectivity mode outband (for details refer to “Configuring the IP Connectivity Mode” on page 132).

### 3.1.3.2 VLANs Translation (Outband Connectivity Mode)

When using In-Band connectivity via the Data port, the default VLAN ID for management packets is 12. The default VLAN ID for data packets is 11. If different VLAN IDs are used in the backbone, the VLANs should be translated accordingly. To enable VLAN translation and configure the required VLANs translation, run the following commands (the examples are for backhaul Data VLAN ID 30 and Management VLAN ID 31):

1. Enable the Data port configuration mode (for details refer to “Enabling the Interface configuration mode” on page 136):
   npu(config)# interface gigabitethernet 0/10
2. Enable VLAN translation (for details refer to “Enabling/Disabling VLAN Translation” on page 145): npu(config-if)# vlan mapping enable
3. Translate data VLAN 11 to the backhaul data VLAN 30 (for details refer to “Creating a VLAN Translation Entry” on page 146):
   npu(config-if)# vlan mapping 11 30
4. Translate management VLAN 11 to the backhaul management VLAN 31:
   npu(config-if)# vlan mapping 12 31
5. Exit the interface configuration mode: npu(config-if) exit
6. To view the VLAN mapping parameters, run the command:
   npu# show interface gigabitethernet 0/10 vlan mapping

### 3.1.3.3 External Management Interface

To configure the necessary parameters of the External Management interface used for connectivity with the EMS system, run the following commands:

1. Enable the External Management interface configuration mode (for details refer to “Enabling the Interface configuration mode” on page 136):
   npu(config)# interface external-mgmt
2. Disable the interface to allow configuring its parameters:
   npu(config-if)# shutdown

3 Configure the IP address (x.x.x.x) and subnet mask (y.y.y.y). For details refer to “Assigning an IP address to an interface” on page 155:npu(config-if)# ip address x.x.x.x y.y.y.y

4 Configure the MTU of the interface to 1500 bytes: npu(config-if)# mtu 1500

5 Enable the interface: npu(config-if)# no shutdown

6 Exit the interface configuration mode: npu(config-if) exit

#### 3.1.3.4 Apply Changes in Site Connectivity Configuration

The system must be reset to apply the changes: npu# reset

### 3.1.4 ACL Definition

For details on ACLs refer to “Configuring ACLs” on page 209.

1 Create a standard ACL (number 1) and enable the ACL configuration mode: npu(config)# "ip access-list standard 1

2 For initial configuration, permit traffic from any source address to any destination address: npu(config-std-nacl)# "permit any any.

3 Terminate the ACL configuration mode: npu(config-std-nacl)# exit

4 Enable the NPU virtual interface configuration mode:
npu(config)# "interface npu-host

5 Attach the ACL to the NPU virtual interface:
npu(config-if)# "ip access-group name 1

6 Terminate the NPU virtual interface configuration mode: npu(config-if)# exit

7 Enable the AUs virtual interface configuration mode:
npu(config)# "interface all-au

8 Attach the ACL to the AUs virtual interface:
npu(config-if)# "ip access-group name 1

9 Terminate the AUs virtual interface configuration mode: npu(config-if)# exit

### 3.1.5 Static Route Definition

Static Route must be configured whenever the EMS server and the NPU are on different subnets. For more details refer to “Adding a Static Route” on page 206.

Run the following command: npu(config)# "ip route 0.0.0.0 0.0.0.0 x.x.x.x"
(x.x.x.x is the IP address of default gateway, 0.0.0.0 0.0.0.0 define the IP address

and mask as “any destination”. Depending on your backhaul network, you may define different IP address and mask to allow only specific destinations).

### 3.1.6 SNMP Manager Definition

To define the communities to be used by the SNMP manager, run the command: npu(config)# snmp-mgr ReadCommunity public ReadWriteCommunity private. For more details refer to “Adding an SNMP Manager” on page 406.

It is recommended to also configure also the Trap Manager parameters and enable sending traps to the defined Trap Manager:

1. npu(config)# trap-mgr ip-source x.x.x.x port 162 TrapCommunity public ( x.x.x.x is the IP address of the EMS server). For more details refer to “Adding a Trap Manager entry” on page 409
2. npu(config)# trap-mgr enable ip-source x.x.x.x

### 3.1.7 Site ID Definition

To define the site ID (Site Number): npu(config)# site identifier x
(x is the unique site identifier, a number in the range from 1 to 999999)

For more details refer to “Configuring the Unique Identifier for the 4Motion Shelf” on page 443.

# 3.2 Completing the Site Configuration Using AlvariSTAR

## 3.2.1 Introduction

After completion of the initial configuration you should be able to manage the new Site using AlvariSTAR and continue configuring (at least) all mandatory parameters to enable the necessary services.

For details on how to use AlvariSTAR for managing 4Motion sites refer to the AlvariSTAR and 4Motion Device Manager User Manuals.

Verify that the Site is included in the list of devices that can be managed by AlvariSTAR. It can be added to the list of managed devices either through the Equipment Manager (by creating a New managed device) or through the Managed Network window (by inclusion in a range to be discovered and activation of the Network Scan Task from the Task Manager).

To complete the minimal configuration, open the Site's Device Manager from the Equipment Manager and perform the following configuration steps:

1 "Site Configuration" on page 95

2 "Connectivity Configuration (optional)" on page 95

3 "Equipment Configuration" on page 95

4 "ASNGW Configuration" on page 97 (only for Distributed ASNGW topology)

5 "BS Configuration" on page 99

6 "Site Sector Configuration" on page 104

**NOTE**

The following sections list the minimum actions that must be performed for completing basic configuration of the Site. Additional parameters may also be configured in order to complete the entire configuration of the Site.

After configuring the mandatory parameters in each screen, click on the Apply button. Click Apply even if you did not change any of the screen's default parameters.

In some of the screens in the following sections there are no mandatory parameters but still you must click on the Apply button to activate the default values.

## 3.2.2 Site Configuration

### 3.2.2.1 General Tab

ASN Topology - Configured is mandatory: The default is Distributed ASNGW.

Click Apply for the device to accept the configuration.

## 3.2.3 Connectivity Configuration (optional)

### 3.2.3.1 IP routing Screen

The IP Routing screen is used to define the static routes for traffic originating from the NPU.

The static route for management traffic was already configured (see "Static Route Definition" on page 92).

If necessary (depending on your specific backhaul network) you may configure additional static route(s) for Bearer Traffic and/or Control Traffic. If additional static routes were defined (or if you made any changes in the already configured static route), click on the Apply button.

## 3.2.4 Equipment Configuration

### 3.2.4.1 Power Supply Screen

The mandatory parameters are:

1. PIU Card Properties (for each entry):
   - Required
   - Required HW Version (if Required is configured to Yes)
2. PSU Card Properties: Required (for each entry)

Click Apply for the device to accept the configuration.

### 3.2.4.2 AU

AU entities must be created for all installed AUs (you may create an AU entity also for AUs that are not installed yet).

**To create a new AU entity:**

1. Right click on the AU level entry in the Navigation Pane. The New AU definition window will open.
2. In the New AU definition window, define the following:
   - AU number (AU Slot)
   - Type
   - Bandwidth
3. Click Apply.
4. In the Card Properties tab of the applicable AU click on the Apply button for the device the accept the configuration.
5. Repeat the process for all required AU entities.

### 3.2.4.3 ODU

ODU entities must be created for all installed ODUs (you may create an ODU entity also for ODUs that are not installed yet).

**To create a new ODU entity:**

1. Right click on the ODU level entry in the Navigation Pane. The New ODU definition window will open.
2. In the New ODU definition window, define the following:
   - ODU number (AU Slot)
   - ODU Type
3. Click Apply.
4. In the ODU General screen of the applicable ODU, in the Ports Configuration section, configure the Tx Power for the relevant ports (currently only ODUs with one port are available). Click on the Apply button for the device the accept the configuration.
5. Repeat the process for all required ODU entities.

### 3.2.4.4 Antenna

Antenna entities must be created for all installed and connected antennas (you may create an Antenna entity also for antennas that are not installed/connected yet).

**To create a new Antenna entity:**

1 In the Anteena screen, click on the Add New Antenna button.

2 In the Antenna Parameters section, define the following:

» Number of Ports

» Heading

3 Click Apply.

4 Repeat the process for all required Antenna entities.

#### 3.2.4.5 GPS

Configured GPS Type is mandatory: The default is Trimble. If there is no GPS, the value should be changed to None.

Click Apply for the device to accept the changes/defaults.

## 3.2.5 ASNGW Configuration

**NOTE**

ASNGW screens are available only for Distributed ASNGW topology (see also "Site Configuration" on page 95.

### 3.2.5.1 AAA Screen

1 Configure the following mandatory parameters:

» Primary AAA Server (IP address)

» RADIUS Shared Secret

2 Click Apply for the device to accept the configuration.

### 3.2.5.2 Service Screen

#### 3.2.5.2.1 Service Interface Tab

**NOTE**

In the current release only one Service Interface is supported..

1 Click on the Add Service Interface button and configure the following mandatory parameters:

- Service Interface Name
- Tunnel Source IP
- Tunnel Destination IP

2 Click Apply for the device to accept the configuration.

#### 3.2.5.2.2 Service Groups Tab

**NOTE**

In the current release only one Service Group is supported..

1 Click on the Add Service Group button and configure the following mandatory parameters:

- Name
- Service Interface Name
- DHCP Function Mode
- DHCP Own IP Address
- External DHCP Server IP Address
- IP Address Pool From
- IP Address Pool To
- Add Excluded IP Addresses
- Excluded IP Addresses List
- Subnet Mask
- Default Gateway IP Address
- DNS Server IP Address

2 Click Apply for the device to accept the configuration.

#### 3.2.5.3 SFA Screen-Service Profiles Tab

At least one Service Profile must be defined and associated with an already defined Service Group.

1 Click on the Add Profile button and configure the following mandatory parameters:

- Name
- Profile Status
- Reference Service Group

2 Click Apply for the device to accept the configuration.

## 3.2.6 BS Configuration

### 3.2.6.1 Creating a New BS Entity

**To create a new BS entity:**

1 Right click on the BS level entry in the Navigation Pane. The New BS definition window will open.

2 In the New BS definition window, define the following:

- BS ID LSB
- Operator ID

3 Click Apply.

4 Complete the BS configuration as described in the following sections.

### 3.2.6.2 Radio

#### 3.2.6.2.1 Basic Screen

##### 3.2.6.2.1.1 General Tab

1 Configure the following mandatory parameters:

- Name
- Bandwidth
- Center Frequency

2 Click Apply for the device to accept the configuration.

#### 3.2.6.2.1.2 Air Frame Structure General Tab

1 Configure the following mandatory parameters:

- Cell ID
- Preamble Group
- Segment Number
- Frame Number Offset
- Total Uplink Duration

2 Click Apply for the device to accept the configuration.

#### 3.2.6.2.1.3 Air Frame Structure Zones Tab

1 Configure the following mandatory parameters:

- Map Zone:
  - Map Size
  - Map Major Groups
  - Basic Map Repetition
- DownLink Data Zone
  - Number of Sub-Channels)
  - Permutation Base
- Up Link Feedback Zone
  - Number of Sub-Channels
  - Permutation Base
- Up Link Data Zone
  - Number of Sub-Channels
  - Permutation Base
  - Start Allocation

2 Click Apply for the device to accept the configuration.

#### 3.2.6.2.1.4 Diversity Tab

1. Configure the following mandatory parameters:
   - Downlink Data MIMO Mode
   - Cyclic Delay:
     - Channel 1
     - Channel 2
     - Channel 3
     - Channel 4
   - Linear Delay
     - Channel 1
     - Channel 2
     - Channel 3
     - Channel 4
   - Logical Stream Mapping)
     - Channel 1
     - Channel 2
     - Channel 3
     - Channel 4
   - Receive
     - Admin Channel 1
     - Admin Channel 2
     - Admin Channel 3
     - Admin Channel 4
2. Click Apply for the device to accept the configuration.

#### 3.2.6.2.2 Advanced Screen

All the parameters in the Advanced screen should be left with their default values. However, the Apply button must be clicked in all of the following tabs for the device to accept the default configuration:

- Feedback
- Channel Descriptors
- Power Control Levels
- Power Control Policy
- Rate Adaptation
- Handover
- Scanning
- Management

### 3.2.6.3 Services

#### 3.2.6.3.1 Definitions Tab

At least one Service must be defined. The default QoS parameters are suitable for a Best Effort (BE) Service.

1. Click the Add Service button and configure the following mandatory parameters:
   - » Service Name
   - » Maximum Downlink Retransmissions
   - » Maximum Uplink Retransmissions
   - » Maximum Sub-Burst Size
   - » Target Packet Error Rate
2. Click Apply for the device to accept the configuration.

#### 3.2.6.3.2 Mapping Tab

At least one Rule must be defined for each defined Service.

1. Click the Add Rule button, specify the Rule Order and configure the following mandatory parameters:
   - R6 Profile:
     - Data Delivery/Scheduling Type
     - Priority
     - Use Media Flow Type
     - Media Flow Type
     - Min. Reserved Traffic Rate
     - Max. Sustained Traffic Rate
     - Latency(
   - Map to Service Type
     - Service Name
   - Map to R1 Profile
     - Modify Service QoS Parameters
     - Default Priority
     - Priority
     - Data Delivery/Scheduling Type
     - Min. Reserved Traffic Rate
     - Max. Sustained Traffic Rate
     - Latency
     - Jitter
     - SDU Size
     - Grant Interval

**NOTE**

If the check box "Modify Service QoS Parameters" is not selected, the remaining Map to R1 Profile parameters are not mandatory..

2. Click Apply for the device to accept the configuration.

### 3.2.6.4 Connectivity

#### 3.2.6.4.1 Bearer Tab

1 Configure the following mandatory parameters:

- » IP Address
- » IP Subnet Musk
- » Default Gateway

2 Click Apply for the device to accept the configuration.

#### 3.2.6.4.2 Authentication Tab

1 Configure the mandatory Default Authentication IP Address parameter.

2 Click Apply for the device to accept the configuration.

## 3.2.7 Site Sector Configuration

**To create a new Site Sector entity:**

1 Right click on the Site Sector level entry in the Navigation Pane. The New Site Sector definition window will open.

2 In the New Site Sector definition window, define the Site Sector Number

3 Click Apply.

4 In the Site Sector Definition section, configure the mandatory Heading parameter. Note that it must be identical to the value configured for the Heading parameter of the applicable Antenna.

5 At least one Site Sector Association must be defined for each Site Sector. Click on the Add Sector Association button and configure all the parameters in the applicable line of the Sector site Association table:

- » BS ID LSB
- » AU Slot Number
- » AU Port Number
- » ODU Number
- » ODU Port Number

- Antenna Number
- Antenna Port Number

6 Click Apply for the device to accept the configuration.

4

# Chapter 4 - Operation and Administration Using the CLI

## In This Chapter:


- "Using the Command Line Interface for 4Motion System Management" on page 108
- "Shutting Down/Resetting the System" on page 126
- "NPU Configuration" on page 129
- "Managing AUs" on page 444
- "Managing ODUs" on page 462
- "Managing Antennas" on page 484
- "Managing BSs" on page 493
- "Monitoring Performance of Hardware and Software Components" on page 755
- "Troubleshooting" on page 800

# 4.1 Using the Command Line Interface for 4Motion System Management

All 4Motion system components are managed via the NPU module. The AU is not accessed directly: any configuration change or status enquiry is sent to the NPU that communicates with other system components.

The following system management options are available:

- Accessing the Command Line Interface (CLI) locally via the MON port
- Using Telnet/Secure Shell (SSH) to access the CLI

The CLI is a configuration and management tool that you can use to configure and operate the 4Motion system, either locally or remotely, via Telnet/SSH. The following are some administrative procedures to be executed using the CLI:

- Specifying the boot mode to be used at the next system reset
- Selecting the connectivity mode
- Shutting down/resetting 4Motion
- Configuring and operating 4Motion
- Monitoring hardware and software components
- Executing debug procedures
- Executing software upgrade procedures

This section provides information about:


- "Accessing the CLI" on page 109
- "Command Modes" on page 111
- "Interpreting the Command Syntax" on page 112
- "Using the CLI" on page 114

■ “Managing Users and Privileges” on page 116

## 4.1.1 Accessing the CLI

You can access the CLI, locally, via an ANSI ASCII terminal or PC that is connected via the DATA port of the NPU. You can also use Telnet/SSH to remotely access the CLI.

This section describes the procedures for:

■ “Accessing the CLI from a Local Terminal” on page 109

■ “Accessing the CLI From a Remote Terminal” on page 110

### 4.1.1.1 Accessing the CLI from a Local Terminal

**To access the CLI via the MON connector:**

1 Use the MON cable to connect the MON connector of the NPU to the COM port of your ASCII ANSI terminal or PC. The COM port connector of the Monitor cable is a 3-pin to 9-pin D-type plug.

2 Run a terminal emulation program, such as HyperTerminal™.

3 Set the communication parameters listed in the following table:

**Table 4-1: COM Port Configuration**

| Parameter | Value |
|---|---|
| Baud rate | 115200 |
| Data bits | 8 |
| Stop bits | 1 |
| Parity | None |
| Flow control | Xon/Xoff |
| Port | Connected COM port |

4 The login prompt is displayed. (Press Enter if the login prompt is not displayed.) Enter your login ID and password to log in to the CLI.

**NOTE**

The default login ID and password are:
Login ID: root
Password: admin123

After you provide your login information, the following command prompt is displayed:

**npu#**

This is the global command mode. For more information about different command modes, refer to Section 4.1.2.

### 4.1.1.2 Accessing the CLI From a Remote Terminal

The procedure for accessing the CLI from a remote terminal differs with respect to the IP connectivity mode. The Ethernet port and IP interface you are required to configure for enabling remote connectivity is different for each connectivity mode. For more information about connectivity modes, and Ethernet ports and IP interface used for operating the 4Motion system, refer "Managing the IP Connectivity Mode" on page 130.

**To access the CLI from a remote terminal, execute the following procedure:**

**IMPORTANT**

The in-band connectivity mode is the default connectivity mode; the DATA port and external-management VLAN are the default Etherent port and IP interface that are configured for the in-band connectivity mode. The following procedure can be used for accessing the CLI when the in-band connectivity mode is selected. This procedure is identical for all other connectivity modes. However, the Ethernet port, VLAN, and IP interface to be configured will differ for the out-of-band and unified connectivity modes, as listed in Table 4-8.

1 Assign an IP address to the external-management interface. For this, execute the following procedure. (Refer Table 4-8 for more information about the IP interface to be configured for the connectivity mode you have selected).

   a Run the following command to enable the interface connectivity mode for the external-management interface:

```
npu(config)# interface external-mgmt
```

   b Run the following command to disable the interface:

```
npu(config-if)# shutdown
```

c Run the following command to assign an IP address to this interface:

```
npu(config-if)# ip address <ip-address> <subnet-mask>
```

d Run the following command to enable this interface:

```
npu(config-if)# no shutdown
```

5 Connect the Ethernet cable to the DATA connector on the front panel of the NPU. (Refer Table 4-8 for more information about the Ethernet port to be used for the connectivity mode you have selected).

6 To enable exchange of packets, create IP-level connectivity between the remote machine and the external-management interface.

7 From the remote terminal, execute the following command to use Telnet/SSH to access the IP address of the external-management interface:

```
telnet <ip address of external-management interface>

ssh <ip address of external-management interface>
```

8 At the prompt, enter your login ID and password.

**NOTE**

The default login ID and password are:
Login ID: root
Password: admin123

After you provide your login information, the following command prompt is displayed:

**npu#**

This is the global command mode. For more information about different command modes, refer to Section 4.1.2.

## 4.1.2 Command Modes

The CLI provides a number of command modes, some of which are listed in the following table for executing different types of commands:

**Table 4-2: CLI Command Modes**

| Mode | Used for... | Command Prompt |
|---|---|---|
| Global configuration mode | Executing all configuration commands | **npu(config)#** |
| Global command mode | Executing all other commands such as show and delete commands | **npu#** |
| Interface configuration mode | Executing all commands for configuring physical and IP interfaces. | **npu(config-if)#** |
| Standard/extended ACL mode | Executing commands for configuring standard and extended ACLs | **npu(config-std-nacl)#**<br>**npu(config-ext-nacl)#** |

The following table lists the commands to be executed for entering/exiting a particular command mode:

**Table 4-3: Commands to Enter/Exit a Command Mode**

| To... | Run the Command... | The Command Mode is Now... |
|---|---|---|
| Enter the global configuration mode | **npu# config terminal** | **npu(config)#** |
| Enter the interface configuration mode | **npu(config)# interface** {<interface-type> <interface-id> \|**internal-mgmt** \|**external-mgmt** \| **bearer** \| **local-mgmt** \| **npu-host** \| **all-au**} | **npu(config-if)#** |
| Exit the configuration mode and enter the global command mode. | **npu(config)# end**<br>**npu (config-if)# end** | **npu#**<br>**npu#** |
| Exit the current configuration mode by one level | **npu (config-if)# exit** | **npu(config)#** |

## 4.1.3 Interpreting the Command Syntax

The following table lists the conventions used in the command syntax for all 4Motion commands:

**Table 4-4: Conventions Used in the 4Motion Command Syntax**

| Convention | Description | Example |
|---|---|---|
| { } | Indicates that the parameters enclosed in these brackets are mandatory, and only one of these parameters should be specified. | **npu(config)# limit** {**cpu** \| **memory**} ([**softlimit** <limit>] [**hardlimit** <limit>])<br><br>This command is used for specifying the soft and hard limits for memory and CPU utilization. The cpu/memory parameters are enclosed within {} brackets, indicating that their presence is mandatory, and that only one of these parameters is required. |
| ( ) | Indicates that one or all parameters enclosed within these brackets are optional. However, the presence of at least one parameter is required to successfully execute this command. | **npu(config)# limit** {**cpu** \| **memory**} ([**softlimit** <limit>] [**hardlimit** <limit>])<br><br>This command is used for specifying the soft and hard limits for memory and CPU utilization. The softlimit and hardlimit parameters are enclosed within () brackets, indicating that you are required to specify the value of at least one of these parameters to successfully execute this command. |
| [ ] | Indicates that the parameter enclosed within these brackets is optional. | **npu(config)# reboot from shadow** [<shadow image name>]<br><br>This command is used to reboot the system with the shadow image. The shadow image name parameter is enclosed with the [ ] brackets, indicating that it is optional. If you do not specify the value of this parameter, the system automatically boots up with the last downloaded shadow image. |
| < > | Indicates that the parameter is mandatory and requires a user-defined value (and not a discrete value). | **npu(config)# load to shadow** <shadow image name><br><br>This command is used to load the system with a particular shadow image. It is mandatory to specify a value for the shadow image name parameter; otherwise an error is raised by the system. The value of this parameter is not a discrete value; you are required to specify a value for this parameter. |

**Table 4-4: Conventions Used in the 4Motion Command Syntax**

| | | |
|---|---|---|
| \| | Indicates the OR conditional operator that is used between two or more parameters. The presence of this parameter indicates that only one of the parameters separated by the I conditional parameter should be specified in the command. | **npu(config)# group enable** {**pmNpuBckhlPort** \| **pmNpuMgmtPort** \| **pmNpuCascPort** \| **pmAuPort** \| **pmNpuIntMgmtIf** \| **pmNpuExtMgmtIf** \| **pmNpuLclMgmtIf** \| **pmNpuBearerIf** \| **pmSfa** \| **pmDatapathFn** \| **pmAaaClient** \| **pmAuthenticator** \| **pmContextFn** \| **pmDhcpProxy** \| **pmDhcpRelay** \| **pmDhcpServer** \| **pmIgmp** \| **pmMipClient** \| **pmMipFa** \| **pmMsStateChangeFn**}<br><br>This command is used to specify the group for which performance data collection and storage is to be enabled. The \| conditional operator indicates that only one parameter should be specified. |

**NOTE**

In this document, all discrete values are specified in boldface, and all user-defined values are not bold.

## 4.1.4 Using the CLI

To help you use the CLI, this section provides information about:


- "Using Control Characters" on page 114
- "Using the CLI Help" on page 115
- "Using the History Feature" on page 115
- "Using Miscellaneous Commands" on page 116
- "Privilege Levels" on page 116


### 4.1.4.1 Using Control Characters

Control characters refer to special characters that you can use to recall or modify previously-executed commands. The following table lists the control characters to be used for executing commands on the CLI:

**Table 4-5: Control Characters for Using the CLI**

| Press | To... |
|---|---|
| Up/Down arrow keys | Scroll the previously executed CLI commands. Press Enter if you want to select and execute a particular command. |
| Right/Left arrow keys | Navigate to the right/left of the selected character in a command. |
| Home key | Navigate to the first character of a command. |
| End key | Navigate to the last character of a command. |
| Backspace key | Delete the characters of a command. |
| TAB key | Prompt the CLI to complete the command for which you have specified a token command. Remember that the CLI that is the nearest match to the token command that you have specified is displayed. |
| ? key | View the list of commands available in the current mode. If you press ? after a command, a list of parameters available for that command is displayed. |

### 4.1.4.2 Using the CLI Help

The CLI provides help that you can access while using the CLI. Execute the following command to obtain help for a specific command:

**`help`** `["<text>"]`

Specify the command name as the parameter to view help for this command. For example, to obtain help for the **`show resource limits`** command, run the following command:

```
npu# help "show resource limits"
```

The help for the **`show resource limits`** command is displayed.

If you do not provide the command name as the parameter, all commands that can be executed in the current command mode are displayed.

### 4.1.4.3 Using the History Feature

The history feature of the CLI maintains a sequential list of all previously executed commands. The following table lists the commands that you can run to access, edit or execute a command from the command history list:

**Table 4-6: Commands for Using the History Feature**

| Run the command... | To... |
|---|---|
| show history | Obtain a list of previously executed commands. |
| !! | Execute the last command displayed in the list of previously executed commands. |
| !<n> | Execute the nth command in the list of previously-executed commands. |
| !<string> | Execute the most recent command in the CLI history that starts with the string entered as the value for the `string` parameter. |

### 4.1.4.4 Using Miscellaneous Commands

The following table lists other miscellaneous commands that you can execute while using the CLI:

**Table 4-7: Miscellaneous Commands**

| Enter the command... | To... |
|---|---|
| **`exit`** | Exit the CLI. After you run this command, provide your login ID and password to access the CLI. |
| **`clear screen`** | Clear the screen. |

### 4.1.4.5 Privilege Levels

All commands that can be executed using the CLI are assigned privilege levels between 0 and 15, where 0 is the lowest, and 15 is the highest. In addition, each user is assigned a privilege level; the user can access only those commands for which the privilege level is the same or lower than the user's privilege level.

The default user, root, is assigned privilege level 15. However, if you are logging in as root, you can execute certain additional commands for managing users and enabling passwords for privilege levels. For more information about managing users and privileges, refer to Section 4.1.5.

## 4.1.5 Managing Users and Privileges

To enable multi-level access to the CLI, you can create and manage multiple users, and assign privilege levels for each user. The privilege level determines whether a user is authorized to execute a particular command. The privilege level is pre-configured for each command, and can be between 0 and 15, where 0 is the lowest and 15 is the highest. The user can execute all commands for which the

privilege level is equal to or lower than the default privilege level assigned to the user.

**IMPORTANT**

By default, the privilege level of users logging in with root privileges is 15. However, the root user can execute some additional commands for adding users and enabling passwords for different privilege levels.

You can also configure passwords for each privilege level. Users with lower privilege levels can enter this password to enable higher privilege levels.

This section describes the commands for:


- "Managing Users" on page 117
- "Managing Privileges" on page 120
- "Enabling/Disabling Higher Privilege Levels" on page 122
- "Displaying Active Users" on page 124
- "Displaying All Users" on page 124
- "Displaying the Privilege Level" on page 125


### 4.1.5.1 Managing Users

You can add/modify/delete one or more users for accessing the CLI either through a local or remote terminal.

**IMPORTANT**

Only users who have logged in as root can add/modify/delete users.

This section describes the commands for:


- "Adding/Modifying Users" on page 118
- "Deleting a User" on page 119

### 4.1.5.1.1 Adding/Modifying Users

**IMPORTANT**

Only users who have logged in as root can execute this task.

To add/modify a user, and assign a username, password, and privilege level, run the following command:

```
npu(config)# username <name> password <password> privilege <0-15>
```

**IMPORTANT**

An error may occur if:

- You are not logged in as the root.
- The username or password that you have specified is more than 20 characters.
- The privilege level that you have specified is not within the range, 0-15.

**Command Syntax**

```
npu(config)# username <name> password <password> privilege <0-15>
```

**Privilege Level**

root

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| **username** <name> | Indicates the user name of the user to be added. | Mandatory | N/A | String (up to 20 characters and case-sensitive) |
| **password** <password> | Indicates the password to be assigned to the user to be added. | Optional | password | String (up to 20 characters and case-sensitive) |
| **privilege** <0-15> | Indicates the privilege level to be assigned to a user. The user will be permitted to execute all commands for which the privilege level is equal to or lower than the value of this parameter. | Mandatory | N/A | 0-15 |

**Command Modes** Global command mode

### 4.1.5.1.2 Deleting a User

**IMPORTANT**

Only users who have logged in as root can execute this task.

To delete a user, run the following command:

```
npu(config)# no user <username>
```

**IMPORTANT**

An error may occur if:

- You are not logged in as root user.
- The username that you have specified does not exist. Remember that user names are case-sensitive.
- You are trying to delete an active user or the root user.

**Command Syntax**

```
npu(config)# no user <username>
```

**Privilege Level** root

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| **username** <name> | Indicates the username of the user to be deleted. | Mandatory | N/A | String (upto 20 characters and case-sensitive) |

**Command Modes** Global command mode

## 4.1.5.2 Managing Privileges

To enable users to execute commands that require a higher privilege level (than their currently configured default level), you can configure a password for each privilege level. Other users can then use the password you have specified to enable a higher privilege level.

**IMPORTANT**

Only users who have logged in as root can assign or delete passwords for any privilege level.

This section describes the commands for:

- "Assigning a Password for a Privilege Level" on page 120
- "Deleting a Password for a Privilege Level" on page 121

### 4.1.5.2.1 Assigning a Password for a Privilege Level

**IMPORTANT**

Only users who have logged in as root can execute this command.

To assign a password for a privilege level, run the following command:

```
npu(config)# enable password  [Level <0-15>] <password>
```

**IMPORTANT**

After you execute this command, any user can use this password to enable the (higher) privilege level for which you have configured the password. For more information about using passwords for enabling higher privilege levels, refer Section 4.1.5.3.

**IMPORTANT**

An error may occur if:

- You are trying to configure a password for a privilege level that is higher than your default privilege level.
- The password that you have specified is more than 20 characters.
- The privilege level that you have specified is not within the range, 0-15.

**Command Syntax**

```
npu(config)# enable password  [Level <0-15>] <password>
```

**Privilege Level**

15

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[Level <0-15>]` | Indicates the privilege level for which a password is to be enabled. | Optional | 15 | 0-15 |
| `<password>` | Denotes the password to be assigned for the current privilege level. | Mandatory | N/A | String (up to 20 characters and case-sensitive) |

**Command Modes**

Global configuration mode

### 4.1.5.2.2 Deleting a Password for a Privilege Level

**IMPORTANT**

Only users who have logged in as root can execute this command.

To delete a password for a privilege level, run the following command:

```
npu(config)# no enable password [Level <0-15>]
```

**IMPORTANT**

An error may occur if:

- The privilege level that you have specified is not within the range, 0-15.
- You are trying to delete a password for a privilege level that is higher than your default privilege level.

**Command Syntax**

```
npu(config)# no enable password [Level <0-15>]
```

**Privilege Level**

root

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[Level <0-15>]` | Indicates the privilege level for which a password is to be disabled. | Optional | 10 | 015 |

**Command Syntax**

Global configuration mode

## 4.1.5.3 Enabling/Disabling Higher Privilege Levels

You can execute commands that require higher privilege levels. If the root user has configured a password for that level, you can use that password to enable higher privilege levels.

For example, if your privilege level is 1, you can provide the password configured for privilege level 10 to execute all commands that require privilege level 10.

This section describes the commands for:

- "Enabling a Higher Privilege Level" on page 122
- "Returning to the Default Privilege Level" on page 123

### 4.1.5.3.1 Enabling a Higher Privilege Level

**To enable a higher privilege level:**

1. Log in to the CLI.
2. Run the following command to specify the privilege level and password:

   **`npu(config)# enable [Level <0-15>]`**

3. At the password prompt, specify the password configured for the privilege level that you have specified.

If you specify the correct password, you are logged in to the CLI with the privilege level that you had specified. You can now execute all commands that require the current privilege level.

**NOTE**

You can display your current privilege level, using the following command:
**`npu# show privilege`**

You can, at any time, return to your default privilege level. For details, refer Section 4.1.5.3.2.

**NOTE**

An error may occur if:

- You have specified an incorrect password. Remember that all passwords are case-sensitive.
- No password is not configured for the privilege level you are trying to access.

**Command Syntax**

**`npu(config)# enable [Level <0-15>]`**

**Privilege Level**

0

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[Level <0-15>]` | Indicates the privilege level you want to enable. | Mandatory | N/A | 0-15 |

**Command Modes**

Global configuration mode

### 4.1.5.3.2 Returning to the Default Privilege Level

Run the following command to disable the current privilege level, and return to your default privilege level:

**`npu(config)# disable [Level <0-15>]`**

After you run this command, you automatically return to your default privilege level. You can display your current privilege level, using the following command:

```
npu# show privilege
```

**Command Syntax**

```
npu(config)# disable [Level <0-15>]
```

**Privilege Level**

0

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [Level <0-15>] | Indicates the privilege level you want to disable. | Mandatory | N/A | 0-15 |

**Command Modes**

Global configuration mode

### 4.1.5.4 Displaying Active Users

To display all active users, run the following command:

```
npu# show users
```

**Command Syntax**

```
npu# show users
```

**Privilege Level**

1

**Display Format**

```
Line      User                  Peer Address
0 con      <user name>          <value>
```

**Command Syntax**

Global command mode

### 4.1.5.5 Displaying All Users

To display all users, run the following command:

```
npu# listuser
```

| | |
|---|---|
| **Command Syntax** | `npu# listuser` |
| **Privilege Level** | 1 |
| **Display Format** | `User  Mode`<br>`User 1  <value>`<br>`User 2  <value>`<br>`User 3  <value>` |
| **Command Syntax** | Global command mode |

### 4.1.5.6 Displaying the Privilege Level

To display your current privilege level, run the following command:

```
npu# show privilege
```

| | |
|---|---|
| **Command Syntax** | `npu# show privilege` |
| **Privilege Level** | 1 |
| **Display Format** | `Current privilege level is <value>` |
| **Command Syntax** | Global command mode |

# 4.2 Shutting Down/Resetting the System

This section describes the commands for:


- "Shutting Down the System" on page 126
- "Managing System Reset" on page 127


## 4.2.1 Shutting Down the System

You can, at any time, use the CLI to shut down the 4Motion system. When you execute the `shutdown` command, the system and all its processes are gracefully shut down. It is also possible that the system may initiate self shutdown if an internal error has occurred.

**IMPORTANT**

Before shutting down the system, it is recommended that you:

- Save the configuration file. The last saved configuration is used for rebooting the system. For more information about saving the current configuration, refer to Section 4.3.4.1.
- Periodically make a backup of log and trace files on the NPU flash if you have configured logs and traces to be written to file. This file does not store log and trace messages after the system is reset or shut down. For details, refer to Section 4.3.11.1.5.

To shut down the 4Motion system, run the following command:

```
npu# npu shutdown
```

A few seconds after you run this command, the system is shut down.

**CAUTION**

The system does not display any warning or request for verification; it immediately shuts down after you execute this command. To start up the NPU (after shut down), either switch off and then switch on the -48V power supply, or disconnect and then reconnect the PIU power cable.

| | |
|---|---|
| **Command Syntax** | `npu# npu shutdown` |
| **Privilege Level** | `10` |

| | |
|---|---|
| **Command Modes** | Global command mode |

## 4.2.2 Managing System Reset

System reset refers to a complete shutdown and reboot of the 4Motion system. You can use the CLI to manually reset the system. It is also possible that the system may be reset because of an internal or external error, or after the NPU is upgraded.

After the system is reset and boots up, you can use the CLI to retrieve the reason for the last system reset. For more information about using the CLI to display the reason for system reset, refer to "Displaying the Reason for the Last System Reset" on page 128.

### 4.2.2.1 Resetting the system

**IMPORTANT**

Before resetting the system, it is recommended that you:

- Save the configuration file. For more information about saving the current configuration, refer to Section 4.3.4.1.
- Periodically make a backup of log and trace files on the NPU flash if you have configured logs and traces to be written to file. This file does not store log and trace messages after the system is reset or shut down. For details, refer to Section 4.3.11.1.5.

To reset the system, run the following command:

```
npu(config)# reset
```

A few seconds after you run this command, the 4Motion system is shut down, and then boots up with the last saved configuration.

| | |
|---|---|
| **Command Syntax** | `npu(config)# reset` |
| **Privilege Level** | `10` |
| **Command Modes** | Global configuration mode |

### 4.2.2.2 Displaying the Reason for the Last System Reset

The 4Motion system may be reset because of any of the following reasons.

- NPU upgrade
- Health failure (an internal module does not respond to the periodic health messages sent by the system)
- Internal error:
  - A system module did not initialize correctly
  - The software image to be used for rebooting the system is invalid or inaccessible.
- System initialization failure after last reboot
- User-initiated system reset
- Generic (unknown error)

To display the reason for the last system reset, run the following command:

```
npu# show reset reason
```

After you run this command, the reason for the last system reset is displayed.

| | |
|---|---|
| **Command Syntax** | `npu# show reset reason` |
| **Privilege Level** | `1` |
| **Display Format** | `Reset reason : <Reason For Last Reset>` |
| **Command Modes** | Global command mode |

# 4.3 NPU Configuration

After installing, commissioning, and powering up 4Motion, you can use the CLI to configure 4Motion and make it completely operational in the network.

Configuration information is stored in a configuration file that resides in the NPU flash. When you power up 4Motion for the first time after installation, the system boots up using the factory default configuration. You can then use the CLI to modify these configuration parameters.

**NOTE**

For more information about accessing the CLI from a local terminal or remotely via Telnet/SSH, refer to, Section 4.1.1.

This section provides information about the following configuration-specific tasks:


- "Managing the IP Connectivity Mode" on page 130
- "Managing the NPU Boot Mode" on page 163
- "Configuring Physical and IP Interfaces" on page 133
- "Managing the 4Motion Configuration File" on page 166
- "Batch-processing of CLI Commands" on page 174
- "Configuring the CPU" on page 176
- "Configuring QoS Marking Rules" on page 190
- "Configuring Static Routes" on page 205
- "Configuring ACLs" on page 209
- "Configuring the ASN-GW Functionality" on page 240
- "Configuring Logging" on page 368
- "Configuring Performance Data Collection" on page 385
- "Configuring the SNMP/Trap Manager" on page 405

- "Configuring the 4Motion Shelf" on page 413

## 4.3.1 Managing the IP Connectivity Mode

The following are the various types of traffic originating or terminating from/to the NPU:

- Subscriber data flows
- ASN/CSN control messages
- Network Management System (NMS) traffic (external management traffic)
- Local management traffic
- Internal management traffic

4Motion has defined separate IP domains for each traffic type:

- Bearer IP domain: Enables connectivity between ASN-GW (NPU), Base Station (BS), AAA server and the Home Agent (HA) for managing transport for subscriber data and the ASN/CSN control traffic.
- NMS IP domain (external management IP domain): Defines the connectivity between NMS agent of the NPU and external NMS server.
- Local management IP domain: Defines the connectivity between the NMS agent of NPU and IP-based local craft terminal.
- Internal management IP domain: Enables connectivity between the NPU NMS agent and management agents for the AU cards.

To enable separation of the bearer IP and NMS IP domains, the following (user-configurable) connectivity modes are defined:

- Out-of-band connectivity mode: In this connectivity mode, the bearer and external NMS IP domains are separated at the Ethernet interface. The DATA port and bearer VLAN is used for the bearer IP domain, and the MGMT port and external-management VLAN is used for external NMS connectivity.
- In-band connectivity mode: In this connectivity mode, the VLAN is used to differentiate between the bearer and external NMS IP domains on the DATA

port. The bearer VLAN is used for the bearer IP domain and the external-management VLAN is used for the external NMS IP domain. The MGMT port is assigned to the local-management VLAN in this connectivity mode.

- Unified connectivity mode: In this connectivity mode, the bearer IP domain and external NMS IP domain are unified. That is, the same IP address and VLAN are used to connect to the NMS server, AAA server, HA, and BS. (The MGMT port is assigned to the local-management VLAN in this connectivity mode.

**IMPORTANT**

For all connectivity modes, the CSCD port enabled in VLAN-transparent bridging mode, and is assigned to local-management VLAN.

For more information about the VLANs that are configured for 4Motion, refer the section, "Configuring Physical and IP Interfaces" on page 133.

**IMPORTANT**

In addition to the bearer IP domain, local-mangement IP domain, and external-management IP domain, each NPU has an internal NMS IP domain. The internal NMS IP domain is used for separating the IP domain for management traffic between the BS and NPU card.

The following table lists the physical interface and VLAN configuration with respect to the connectivity mode:

**Table 4-8: Ethernet and VLAN-to-Connectivity Mode Configuration**

| Connectivity Mode | Bearer IP Domain | External-Management IP Domain | Local-management IP Domain |
|---|---|---|---|
| Out-of-band | ■ DATA port<br>■ Bearer VLAN | ■ MGMT port<br>■ External-management VLAN | ■ CSCD port<br>■ Local-management VLAN |
| In-band | ■ DATA port<br>■ Bearer VLAN | ■ DATA port<br>■ External-management VLAN | ■ CSCD and MGMT ports<br>■ Local-management VLAN |
| Unified | ■ DATA port<br>■ Bearer VLAN | ■ DATA port<br>■ Bearer VLAN | ■ CSCD and MGMT ports<br>■ Local-management VLAN |

This section describes the commands for:


- "Configuring the IP Connectivity Mode" on page 132
- "Displaying the IP connectivity Mode" on page 132


### 4.3.1.1 Configuring the IP Connectivity Mode

To configure the IP connectivity mode, run the following command:

**`npu(config)# connectivity mode {inband | outband | unified}`**

In-band is the default connectivity mode. You can display the currently configured connectivity mode. For details, refer Section 4.3.1.2.

**IMPORTANT**

Reset the system for the change in connectivity mode to take effect.

**Command Syntax**

**`npu(config)# connectivity mode {inband | outband | unified}`**

**Privilege Level**

**`10`**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{inband \| outband \| unified}` | Indicates the connectivity mode to be configured. | Mandatory | inband | ■ inband<br>■ outband<br>■ unified |

**Command Modes**

Global configuration mode

### 4.3.1.2 Displaying the IP connectivity Mode

To display the IP connectivity mode, run the following command:

**`npu# show connectivity mode`**

| | |
|---|---|
| **Command Syntax** | **npu# show connectivity mode** |
| **Privilege Level** | **1** |
| **Display Format** | `connectivity mode is <value>` |
| **Command Modes** | Global command mode |

## 4.3.2 Configuring Physical and IP Interfaces

The following Gigabit Ethernet interfaces are provided on the front panel of the NPU for enabling connectivity with external entities:

- DATA port: Connects the NPU with the operator network.
- CSCD port: Provides a dedicated Ethernet connectivity to the local management NMS Server, or supports concatenation of two or more 4Motion chassis, or concatenation of the Micro BS with 4Motion. (Concatenation is not supported in the current release. This port is intended for future use.)
- MGMT port: Provides a dedicated Ethernet interface for external EMS server connectivity. In some configurations the MGMT port is used for connecting the local NMS server (IP-based craft terminal).

You can configure the speed, duplex, encapsulation mode, default port VLAN identifier, and MTU for these interfaces.

In addition to these Gigabit Ethernet interfaces, you can also configure seven Fast Ethernet interfaces from the NPU towards the AUs. These interfaces are internal NPU interfaces, and are not accessible to user.

Based on the connectivity mode, 4Motion initializes the following pre-configured IP interfaces:

- Local-management: Used for enabling connectivity with the local NMS server that is connected via the MGMT port when 4Motion is operating in the in-band connectivity mode; or via CSCD port when 4Motion is operating in the out-of-band connectivity mode. The IP address used for the local-management

interface is intended for "back-to-back" connection between NPU and Local NMS Server.

- Internal-management: Used for enabling the NMS connectivity between the AU and NPU. This interface is used internally by 4Motion and is not reachable from user-visible ports. The IP address and VLAN identifier used for the internal-management interface is not user-configurable.

- External-management: Used for enabling connectivity with the NMS server that is connected via the DATA port when 4Motion is operating in the in-band connectivity mode, or via MGMT port when 4Motion is operating in the out-of-band connectivity mode.

- Bearer: Used for enabling bearer IP domain connectivity. When the Unified connectivity mode is selected, the NMS server is also connected using bearer interface.

You can configure the IP address and VLAN ID for bearer, external-management and local-management interfaces. The following table lists the default VLAN IDs assigned to pre-configured IP interfaces.

**Table 4-9: Default VLAN IDs**

| Interface | Default VLAN ID |
|---|---|
| Local-management | 9 |
| Internal-management | 10 |
| Bearer | 11 |
| External-management | 12 |

In addition to the physical and IP interfaces, 4Motion defines the following virtual interfaces. These interfaces are used only for applying Access Control Lists (ACLs) for filtering traffic destined towards the NPU or AUs.

- NPU

- All AUs

This section describes the commands for:

- “Configuring physical interfaces” on page 135

- “Configuring IP interfaces” on page 152
- “Configuring Virtual Interfaces” on page 159
- “Displaying Status and Configuration Information for Physical, IP, and Virtual Interfaces” on page 160

### 4.3.2.1 Configuring physical interfaces

The NPU contains seven AU-facing Fast Ethernet interfaces, and three Gigabit Ethernet interfaces. Each of these interfaces is a member of one or more VLANs. The following table lists the physical interfaces, and their type, port numbers and member VLANs:

**Table 4-10: Ethernet Interfaces - Types, Port Numbers, and Member VLANs**

| Interface Type | Physical Interfaces | Port Number | Member VLANs |
|---|---|---|---|
| Fast Ethernet | Seven Fast Ethernet interfaces towards the AU (internal to the NPU) | 0/1-0/7 | ■ Bearer<br>■ Internal-management |
| Gigabit Ethernet | MGMT | 0/8 | ■ Local-management (in the in-band or out-of-band connectivity modes)<br>■ External-management (only in the out-of-band connectivity mode) |
| | CSCD | 0/9 | ■ Local-management |
| | DATA | 0/10 | ■ Bearer·<br>■ External-management (only in-band connectivity mode) |

**To configure a physical interface:**

1. Enable the interface configuration mode (refer Section 4.3.2.2.1).
2. You can now enable any of the following tasks:
   - » Configure the Encapsulation mode and specify the VLAN ID if required (refer Section 4.3.2.1.2).

- Modify the physical properties of an interface (refer Section 4.3.2.1.3).
- Manage VLAN translation (refer Section 4.3.2.1.4).

3 Terminate the interface configuration mode (refer Section 4.3.2.2.6).

You can, at any time, display VLAN membership information (refer Section 4.3.2.1.6), VLANs configured for Ethernet interfaces (refer Section 4.3.2.1.7), and VLAN translation entries for the DATA port (refer Section 4.3.2.1.8).

### 4.3.2.1.1 Enabling the Interface configuration mode

To configure a physical interface, run the following command to enable the interface configuration mode.

```
npu(config)# interface {<interface-type> <interface-id>
|internal-mgmt |external-mgmt | bearer | local-mgmt | npu-host |
all-au}
```

**Table 4-11: Parameters for Configuring the Interface Configuration Mode (Ethernet Interfaces)**

| Interface | Parameter | Example |
|---|---|---|
| Fast Ethernet | <interface-type> <interface-id> | **npu(config)# interface fastethernet 0/1**<br>**npu(config)# interface fastethernet 0/2**<br>**npu(config)# interface fastethernet 0/3**<br>**npu(config)# interface fastethernet 0/4**<br>**npu(config)# interface fastethernet 0/5**<br>**npu(config)# interface fastethernet 0/6**<br>**npu(config)# interface fastethernet 0/7** |
| Gigabit Ethernet | <interface-type> <interface-id> | **npu(config)# interface gigabitethernet 0/8**<br>**npu(config)# interface gigabitethernet 0/9**<br>**npu(config)# interface gigabitethernet 0/10** |

**IMPORTANT**

To enable the interface configuration mode for physical interfaces, specify values for the `interface-type` and `interface-id` parameters only. The `internal-mgmt`, `external-mgmt`, `bearer`, `local-mgmt` parameters are used for enabling the interface configuration mode for IP interfaces; the `npu-host` and `all-au` parameters are used for enabling the interface configuration mode for virtual interfaces. For more information about configuring IP interfaces, refer Section 4.3.2.2; refer Section 4.3.2.3 for configuring virtual interfaces.

**IMPORTANT**

An error may occur if the interface type and ID that you have specified is in an invalid format or does not exist. Refer the syntax description for more information about the correct format for specifying the interface type and name.

After enabling the interface configuration mode, you can:

- Configure the encapsulation mode and specify the VLAN ID (refer Section 4.3.2.1.2)
- Modify the physical properties of an interface (refer Section 4.3.2.1.3)
- Manage VLAN translation (refer Section 4.3.2.1.4)

**Command Syntax**

```
npu(config)# interface {<interface-type> <interface-id> |internal-mgmt
|external-mgmt | bearer | local-mgmt | npu-host | all-au}
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <interface-type> | Indicates the type of physical interface (Gigabit Ethernet or Fast Ethernet) for which the configuration mode is to be enabled. | Mandatory | N/A | ■ fastethernet<br>■ gigabitethernet |

| | | | | | |
|---|---|---|---|---|---|
| | <interface-id> | Indicates the port number of the physical interface for which the configuration mode is to be enabled. | Mandatory | N/A | Fast Ethernet:<br>■ 0/1<br>■ 0/2<br>■ 0/3<br>■ 0/4<br>■ 0/5<br>■ 0/6<br>■ 0/7<br>Gigabit Ethernet:<br>■ 0/8<br>■ 0/9<br>■ 0/10 |

**Command Modes** Global configuration mode

#### 4.3.2.1.2 Configuring the Encapsulation mode

The encapsulation mode configures the physical interface to either accept VLAN-tagged or untagged packets. The following are the encapsulation modes supported by 4Motion:

- 802.1q mode: In this mode, the interface accepts only VLAN-tagged packets. All packets received without VLAN tags are dropped.
- 802.3 mode: In this mode, the interface accepts packets without VLAN tags. The port VLAN ID is used as the VLAN identifier for processing untagged packets. For more information about configuring the port VLAN ID, refer. Section 4.3.2.1.2.1

**NOTE**

Before configuring the encapsulation mode, ensure that VLAN translation for this physical interface is disabled. For more information about managing VLAN translation, refer to Section 4.3.2.1.4.

Run the following command to specify the encapsulation mode to be used for this physical interface:

**npu(config-if)# encapsulation {802.1q | 802.3}**

**IMPORTANT**

An error may occur if VLAN translation is enabled when you run this command.

**Command Syntax** **npu(config-if)# encapsulation {802.1q | 802.3}**

**Privilege Level** **10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {802.1q \| 802.3} | Indicates the encapsulation mode to be used for the physical interface.<br>If you specify 802.3 as the encapsulation mode, specify the VLAN ID to be used for this physical interface. For more information about configuring the VLAN ID, refer to Section 4.3.2.1.2.1. | Mandatory | 802.1q | ■ 802.1q<br>■ 802.3 |

**Command Modes** Interface configuration mode

### 4.3.2.1.2.1 Configuring the Port VLAN ID

If the encapsulation mode for this physical interface is 802.3, you are required to configure the port VLAN ID. The port VLAN ID is used as the VLAN identifier for untagged packets received on this interface. The following table lists the default port VLAN ID for each VLAN:

**Table 4-12: Default VLAN IDs For Ethernet interfaces**

| Physical Port | Default VLAN ID |
|---|---|
| MGMT | 9 |
| CSCD | 9 |
| DATA | 11 |
| 7 AU Fast Ethernet interfaces | 11 |

To configure the port VLAN ID, run the following command:

```
npu(config-if)# switchport pvid <vlan-id(11-4094)>
```

**IMPORTANT**

An error may occur if the VLAN ID that you have specified:

- Does not exist
- Is not a member VLAN for this interface.

**Command Syntax**

```
npu(config-if)# switchport pvid <vlan-id(11-4094)>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <vlan-id(11-4094)> | Indicates the ID for the member VLAN of this physical interface. | Manadtory | N/A | 11-4094 |

**Command Modes**

Interface configuration mode

#### 4.3.2.1.3 Configuring the Properties of the Physical Interface

After you enable the interface configuration mode, you can configure the following properties for this interface:

- Auto-negotiation mode
- Duplex (full/half) mode
- Port speed
- MTU

Before you modify the properties of a physical interface, first shut down the interface. This section describes the commands to be used for:


- "Shutting down the interface" on page 141
- "Defining the auto-negotiation mode" on page 141
- "Specifying the Duplex Status" on page 142
- "Specifying the port speed" on page 143
- "Configuring the MTU for physical interfaces" on page 144


#### 4.3.2.1.3.1 Shutting down the interface

Run the following command to shut down this physical interface:

```
npu(config-if)# shutdown
```

Run the following command to enable this physical interface:

```
npu(config-if)# no shutdown
```

| | |
|---|---|
| **Command Syntax** | `npu(config-if)# shutdown`<br>`npu(config-if)# no shutdown` |
| **Privilege Level** | `10` |
| **Command Modes** | Interface configuration mode |

#### 4.3.2.1.3.2 Defining the auto-negotiation mode

The auto-negotiation feature enables the system to automatically negotiate the port speed and the duplex (half or full) status with the link partner. If you disable

auto-negotiation, you are required to manually configure the port speed and duplex status.

**IMPORTANT**

By default, auto-negotiation is enabled.

Run the following command to enable the auto-negotiation mode:

```
npu(config-if)# auto-negotiate
```

Enter the following command if you want to disable the auto-negotiation mode:

```
npu(config-if)# no auto-negotiate
```

After you disable auto-negotiation, you can manually configure the port speed and duplex status. For details, refer to Section 4.3.2.1.3.3 and Section 4.3.2.1.3.4

**IMPORTANT**

An error may occur if you run this command when the physical interface is enabled.

| | |
|---|---|
| **Command Syntax** | `npu(config-if)# auto-negotiate`<br>`npu(config-if)# no auto-negotiate` |
| **Privilege Level** | `10` |
| **Command Modes** | Interface configuration mode |

### 4.3.2.1.3.3 Specifying the Duplex Status

The duplex status for an interface can be either full-duplex or half duplex. If you have disabled the auto-negotiation feature, specify whether data transmission should be half or full duplex.

**IMPORTANT**

By default, full-duplex is enabled if auto-negotiation is disabled.

Run the following command to configure the full duplex mode for this interface:

```
npu(config-if)# full-duplex
```

Run the following command to configure the half duplex mode for this interface:

```
npu(config-if)# half-duplex
```

**IMPORTANT**

An error may occur if you run this command when:

- The physical interface is enabled.
- Auto-negotiation is enabled.

| | |
|---|---|
| **Command Syntax** | `npu(config-if)# full-duplex`<br>`npu(config-if)# half-duplex` |
| **Privilege Level** | `10` |
| **Command Modes** | Interface configuration mode |

#### 4.3.2.1.3.4 Specifying the port speed

If you have disabled the auto-negotiation feature, you can run the following command configure the port speed to be used for this physical interface.

```
npu(config-if)# speed {10 | 100 | 1000}
```

By default, the port speed for the Fast Ethernet interfaces is 100 Mbps, and for the Gigabit Ethernet interfaces is 1000 Mbps.

**IMPORTANT**

An error may occur if you run this command when:

- The physical interface is enabled.
- Auto-negotiation is enabled.

| | |
|---|---|
| **Command Syntax** | `npu(config-if)# speed {10 \| 100 \| 1000}` |

**Privilege Level** **10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {**10** \| **100** \| **1000**} | Indicates the speed, in Mbps, to be configured for this physical interface. | Mandatory | N/A | ■ 10<br>■ 100<br>■ 1000 |

**Command Modes** Interface configuration mode

### 4.3.2.1.3.5 Configuring the MTU for physical interfaces

You can configure the MTU for the physical interface. If the port receives packets that are larger than the configured MTU, packets are dropped. By default, the MTU for the 802.3 mode is 1518, and the MTU for the 802.1q mode is 1522.

Run the following command to configure the MTU of the physical interface:

**npu(config-if)# mtu** <frame-size(1518-9000)>

**IMPORTANT**

An error may occur if you run this command when the physical interface is enabled.

**Command Syntax** **npu(config-if)# mtu** <frame-size(1518-9000)>

**Privilege Level** **10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<frame-size(1518-9000)>` | Indicates the MTU to be configured for the physical interface. | mandatory | ■ 1518 for 802.3 mode<br>■ 1522 for 802.1q mode | 1518-9000 |

**Command Modes**

Interface configuration mode

#### 4.3.2.1.4 Managing VLAN Translation

4Motion supports translation of the VLAN ID for packets received and transmitted on the DATA port to a configured VLAN ID. Before starting VLAN translation, first enable VLAN translation, and then create one or more VLAN translation entries.

This section describes the commands for:


- "Enabling/Disabling VLAN Translation" on page 145
- "Creating a VLAN Translation Entry" on page 146
- "Deleting a VLAN Translation Entry" on page 147


##### 4.3.2.1.4.1 Enabling/Disabling VLAN Translation

You can enable VLAN translation for DATA port (0/10) only if you have enabled the 802.1q encapsulation mode. By default, VLAN translation is disabled. Run the following command to enable/disable VLAN translation on the 0/10 interface:

```
npu(config-if)# vlan mapping {enable|disable}
```

**IMPORTANT**

An error may occur when you run this command:

- If you have not enabled the 802.1q encapsulation mode.
- For an interface other than the DATA port (0/10).

**Command Syntax**

```
npu(config-if)# vlan mapping {enable|disable}
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{enable\|disable}` | Indicates whether VLAN translation should be enabled or disabled for this interface. | Mandatory | disable | ■ enable<br>■ disable |

**Command Modes**

Interface configuration mode

### 4.3.2.1.4.2 Creating a VLAN Translation Entry

A VLAN translation entry contains a mapping between the original and translated VLANs. To create a VLAN translation entry, run the following command:

```
npu(config-if)# vlan mapping <integer(11-4094)> <integer(11-4094)>
```

Specify the original VLAN ID and the translated VLAN ID.

**IMPORTANT**

An error may occur if:

- The original and translated VLAN ID that you have specified is not within the range, 11-4094.
- The translated VLAN ID that you have specified is already a member VLAN for this port.
- You are trying to create a VLAN translation entry for a VLAN that is not a member of DATA port.
- A VLAN translation mapping already exists for the original VLAN IDs that you have specified.
- VLAN translation is disabled.

**Command Syntax**

```
npu(config-if)# vlan mapping <integer(11-4094)> <integer(11-4094)>
```

**Privilege Level**

`10`

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<integer(11-4094)>` | Indicates the VLAN ID of the VLAN for which VLAN translation is required. | Mandatory | N/A | 11-4094 |
| `<integer(11-4094)>` | Indicates the translated VLAN ID that is being mapped to the original VLAN ID. | Mandatory | N/A | 11-4094 |

**Command Modes**

Interface configuration mode

### 4.3.2.1.4.3 Deleting a VLAN Translation Entry

To delete an existing VLAN translation entry, run the following command:

```
npu(config-if)# no vlan mapping {all | <integer(11-4094)>
<integer(11-4094)>}
```

Specify `all` if you want to delete all the VLAN translation mapping entries. Specify the VLAN identifiers of the translation entry if you want to delete a specific VLAN entry.

**IMPORTANT**

An error may occur if:

- The VLAN ID or mapping that you have specified is not within the range, 11-4094 or it does not exist.
- You are trying to delete a VLAN translation entry for a VLAN that is not a member of this physical interface.

**Command Syntax**

```
npu(config-if)# no vlan mapping {all | <integer(11-4094)>
<integer(11-4094)>}
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {all \| <integer(11-4094)> <integer(11-4094)>} | Indicates the VLAN translation entry to be deleted. | Mandatory | N/A | ■ all: Indicates that all VLAN translation entries are to be deleted.<br>■ <integer(11-4094)> <integer(1-4094)>: Indicates the original and translated VLAN IDs for the translation entry to be deleted. |

**Command Modes**

Global command mode

### 4.3.2.1.5 Terminating the Interface Configuration Mode

To terminate the interface configuration mode, run the following command:

```
npu(config-if)# exit
```

**Command Syntax**

```
npu(config-if)# exit
```

**Privilege Level**

10

**Command Modes**

Interface configuration mode

#### 4.3.2.1.6 Displaying VLAN Membership Information

Run the following command to display Ethernet interfaces that are members of a particular or all VLAN:

```
npu# show vlan [id <vlan-id(11-4094)>]
```

Do not specify the VLAN ID if you want to view membership information for all VLANs.

**Command Syntax**

```
npu# show vlan [id <vlan-id(11-4094)>]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[id <vlan-id(11-4094)>]` | Indicates the VLAN ID for which membership information is to be displayed. Do not specify any value for this parameter if you want to view VLAN membership information for all VLANs. | Mandatory | N/A | 11-4096 |

**Display Format**

```
Vlan            Name            Ports
 ----            ----            -----
<VLAN ID    <>VLAN Name>      <member ports>
<VLAN ID    <>VLAN Name>      <member ports>
```

**Command Modes**

Global command mode

### 4.3.2.1.7 Displaying VLAN Configuration Information for Physical Interfaces

To display the configuration information for a VLAN that is bound to a particular physical interface, run the following command:

**`npu# show vlan port config`** `[port <interface-type> <interface-id>]`

Do not specify the port number and type if you want to display configuration information for all physical interfaces.

**IMPORTANT**

An error may occur if you specify an interface type or ID that does not exist.

**Command Syntax**

**`npu# show vlan port config`** `[port <interface-type> <interface-id>]`

**Privilege Level**

**1**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<interface-type>` | Indicates the type of physical interface for which VLAN membership information is to be displayed. | Optional | N/A | ■ fastethernet<br>■ gigabitethernet |

| | | | | | |
|---|---|---|---|---|---|
| | <interface-id> | Indicates the ID of the physical interface for which VLAN membership information is to be displayed. | Optional | N/A | Fast Ethernet:<br>■ 0/1<br>■ 0/2<br>■ 0/3<br>■ 0/4<br>■ 0/5<br>■ 0/6<br>■ 0/7<br>Gigabit Ethernet:<br>■ 0/8<br>■ 0/9<br>■ 0/10 |

**Display Format**

```
Vlan Port configuration table
----------------------------------------
Port                                    <port number>
 Port Vlan ID                           : <value>
 Port Acceptable Frame Type             : <value>
 Port Ingress Filtering                 : <Enabled/Disabled>
```

**Command Modes**

Global command mode

### 4.3.2.1.8 Displaying the VLAN Translation Entries

Run the following command to display VLAN translation entries for a Gigabit Ethernet interface:

**npu# show interface gigabitethernet** <interface-id> **vlan mapping**

**IMPORTANT**

An error may occur if you specify an interface ID that does not exist.

**Command Syntax**

**`npu# show interface gigabitethernet`** `<interface-id>` **`vlan mapping`**

**Privilege Level**

**1**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<interface-id>` | Indicates the identifier of the Gigabit Ethernet interface for which VLAN translation entries are to be displayed. | Mandatory | N/A | ■ 0/8<br>■ 0/9<br>■ 0/10 |

**Command Modes**

Global command mode

## 4.3.2.2 Configuring IP interfaces

The following IP interfaces are pre-configured in the system:

- Local-management
- Internal-management
- External-management
- Bearer

**IMPORTANT**

You cannot modify the IP address and VLAN identifier for the internal-management interface.

**To configure an IP interface:**

1. Enable the interface configuration mode (refer Section 4.3.2.2.1).
2. Shut down the IP interface (if you are modifying configuration information for this interface) (refer Section 4.3.2.2.2).
3. You can now:
   - Assign an IP address to an interface (refer Section 4.3.2.2.3).
   - Remove an IP address associated with an interface (refer Section 4.3.2.2.4).
   - Modify the VLAN ID (refer Section 4.3.2.2.5).
4. Enable the IP interface (refer Section 4.3.2.2.2).
5. Terminate the interface configuration mode (refer Section 4.3.2.2.6).

You can, at any time, display configuration information for an IP interface (refer Section 4.3.2.2.7).

### 4.3.2.2.1 Enabling the Interface Configuration Mode

To configure an IP interface, run the following command to enable the interface configuration mode:

```
npu(config)# interface {<interface-type> <interface-id>
|internal-mgmt |external-mgmt | bearer | local-mgmt | npu-host |
all-au}
```

The following table lists the IP interfaces that each parameter represents:

**Table 4-13: Parameters for Configuring the Interface Configuration Mode (IP Interfaces**

| IP Interface | Parameter | Example |
|---|---|---|
| Internal-management | `internal-mgmt` | **`npu(config)# interface internal-mgmt`** |
| External-management | `external-mgmt` | **`npu(config)# interface external-mgmt`** |
| Bearer | `bearer` | **`npu(config)# interface bearer`** |
| Local-management | `local-mgmt` | **`npu(config)# interface local-mgmt`** |

**IMPORTANT**

To enable the interface configuration mode for IP interfaces, specify values for the for `internal-mgmt`, `external-mgmt`, `bearer`, `local-mgmt` only. The `interface-type` and `interface-id` parameters are used for enabling the interface configuration mode for physical interfaces; the `npu-host` and `all-au` parameters are used for enabling the interface configuration mode for virtual interfaces. For more information about configuring physical interfaces, refer Section 4.3.2.1; refer Section 4.3.2.3 for configuring virtual interfaces.

After enabling the interface configuration mode for this interface, you can:

- Assign an IP address to an interface (refer Section 4.3.2.2.3).
- Remove an IP address associated with an interface (refer Section 4.3.2.2.4).
- Modify the VLAN ID (refer Section 4.3.2.2.5).

**Command Syntax**

```
npu(config)# interface {<interface-type> <interface-id>
|internal-mgmt |external-mgmt | bearer | local-mgmt | npu-host |
all-au}
```

**Privilege Level**

`10`

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| **internal-mgmt \|external-mgmt \| bearer \| local-mgmt** | Indicates the IP interface for which the configuration mode is to be enabled. | Mandatory | N/A | ■ internal-mgmt<br>■ external-mgmt<br>■ bearer<br>■ local-mgmt |

**Command Modes**

Global configuration mode

### 4.3.2.2.2 Shutting down/Enabling an IP Interface

To modify configuration for an IP interface, first shut down the IP interface, using the following command:

**npu(config-if)# shutdown**

After you have modified configuration for this interface, run the following command to enable the interface:

**npu(config-if)# no shutdown**

| | |
|---|---|
| **Command Syntax** | **npu(config-if)# shutdown**<br>**npu(config-if)# no shutdown** |
| **Privilege Level** | **10** |
| **Command Modes** | Interface configuration mode |

### 4.3.2.2.3 Assigning an IP address to an interface

Run the following command to assign an IP address and subnet mask for an IP interface. Shut down this interface before executing this command:

**npu(config-if)# ip address** <ip-address> <subnet-mask>

**IMPORTANT**

You can configure the IP address and subnet mask for only the external-management, local-management, and bearer interfaces.

For example, run the following command to assign the IP address, 172.10.1.0, and subnet mask, 255.255.255.0 to the external-management interface:

**npu (config-if)# ip address 172.10.1.0 255.255.255.0**

**IMPORTANT**

An error may occur if:

- The IP address you have specified is already configured for another interface.
- You are trying to assign an IP address for an interface for which IP address configuration is not permitted. This error is caused only for the internal-management interface.
- The IP address and address mask are inconsistent. (If the address mask byte is 0, the IP address byte should also be 0. For example, if the address mask is 255.255.255.0, the IP address should be 11.2.3.0.)
- The IP interface is enabled. Shut down the IP interface before executing this command.

**Command Syntax**

```
npu(config-if)# ip address <ip-address> <subnet-mask>
```

**Privilege Level**

`10`

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<ip-address>` | Indicates the IP address to be assigned to this IP interface. | Mandatory | N/A | Valid IP address |
| `<subnet-mask>` | Indicates the subnet mask to be assigned to this IP interface. | Mandatory | N/A | Valid subnet mask |

**Command Modes**

Interface configuration mode

### 4.3.2.2.4 Removing an IP address from an interface

To remove an IP address from an interface, run the following command. Shut down this interface before executing this command:

```
npu(config-if)# no ip address
```

**IMPORTANT**

An error may occur if you run this command when this IP interface is enabled. Shut down the IP interface before executing this command

| | |
|---|---|
| **Command Syntax** | **npu(config-if)# no ip address** |
| **Privilege Level** | **10** |
| **Command Modes** | Interface configuration mode |

### 4.3.2.2.5 Configuring/Modifying the VLAN ID for an IP interface

**IMPORTANT**

You can modify the VLAN ID for only the bearer and external-management interfaces.

Run the following command to modify the VLAN ID for this interface:

**npu(config-if)# if_vlan** <vlanid(9 | 11-100 | 110-4094)>

**NOTE**

Refer Table 4-9 for the default VLAN IDs assigned to the bearer and external-management interfaces.

**IMPORTANT**

An error may occur if:

- The VLAN ID you have specified is not within the specified, or is in use by another VLAN. Refer the syntax description for the VLAN ID range.
- The VLAN ID is already used as a translated VLAN or a VLAN translation entry already exists for this VLAN.
- You are trying to run this command for the internal-management or local-management interface. You can modify the VLAN ID for only the external-management or bearer interfaces.

| | |
|---|---|
| **Command Syntax** | **npu(config-if)# if_vlan** <vlanid(9 \| 11-100 \| 110-4094)> |
| **Privilege Level** | **10** |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<vlanid(9 \| 11-100 \| 110-4094)` | Indicates the VLAN ID to be assigned to this interface.<br>**Note**: The VLAN IDs, 1-8, 10, 101-109 are reserved. | Mandatory | N/A | ■ 9<br>■ 11-100<br>■ 110-4094 |

**Command Modes**

Global command mode

### 4.3.2.2.6 Terminating the Interface Configuration Mode

To terminate the interface configuration mode, run the following command:

```
npu(config-if)# exit
```

**Command Syntax**

```
npu(config-if)# exit
```

**Privilege Level**

10

**Command Modes**

Interface configuration mode

### 4.3.2.2.7 Displaying IP Interface Status and Configuration Information

To display the status and configuration information for an IP interface, run the following command:

```
npu# show ip interface [{internal-mgmt | external-mgmt | bearer | local-mgmt}]
```

Do not specify the interface if you want to view configuration information for all IP interfaces.

**IMPORTANT**

An error may occur if the IP interface does not exist for the configured connectivity and boot mode.

**Command Syntax**

```
npu# show ip interface [{internal-mgmt | external-mgmt | bearer |
local-mgmt}]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {**internal-mgmt** \| **external-mgmt** \| **bearer** \| **local-mgmt**} | Indicates the interface for which configuration information is to be displayed.<br>Do not specify any value for this parameter if you want to view configuration information for all IP interfaces. | Optional | N/A | ■ internal-mgmt<br>■ external-mgmt<br>■ bearer<br>■ local-mgmt |

**Display Format**

```
<Interface Name> is <up/down>
Internet Address is <value>
Broadcast Address  <value>
```

**Command Modes**

Global command mode

### 4.3.2.3 Configuring Virtual Interfaces

In addition to physical and IP interfaces, 4Motion defines the following virtual interfaces. All ACLs configured for filtering traffic destined towards the NPU or AUs, are attached to either of these interfaces.

- NPU-host: Used for configuring ACLs to filter traffic destined towards the NPU.
- All-AU: Used for configuring ACLs to filter traffic destined towards the AUs in the 4Motion shelf.

For more information about attaching ACLs to the NPU or all-AUs, refer the section, “Attaching/De-attaching ACLs to/from an Interface” on page 235.

### 4.3.2.4 Displaying Status and Configuration Information for Physical, IP, and Virtual Interfaces

To display the status and configuration information for physical, IP and/or virtual interfaces, run the following command:

**npu# show interfaces** [{[<interface-type> <interface-id>] | **internal-mgmt** | **external-mgmt** | **bearer** | **local-mgmt** | **npu-host** | **all-au** }]

To display the configuration information for all interfaces, do not specify a value for any parameter.

The following table lists parameters to be specified with respect to the type of interface for which configuration information is to be displayed:

**Table 4-14: Parameters for Displaying Configuration Information for Physical, IP, and Virtual Interfaces**

| Interface | Parameters | Example |
|---|---|---|
| All Interfaces | None | **npu(config)# show interfaces** |
| Physical Interfaces | **Fast Ethernet:**<br><interface-type> <interface-id> | **npu(config)# show interfaces fastethernet 0/1**<br>**npu(config)# show interfaces fastethernet 0/2**<br>**npu(config)# show interfaces fastethernet 0/3**<br>**npu(config)# show interfaces fastethernet 0/4**<br>**npu(config)# show interfaces fastethernet 0/5**<br>**npu(config)# show interfaces fastethernet 0/6**<br>**npu(config)# show interfaces fastethernet 0/7** |
| | **Gigabit Ethernet**<br><interface-type> <interface-id> | **npu(config)# show interfaces gigabitethernet 0/8**<br>**npu(config)# show interfaces gigabitethernet 0/9**<br>**npu(config)# show interfaces gigabitethernet 0/10** |
| IP Interfaces | internal-mgmt | **npu(config)# show interfaces internal-mgmt** |
| | external-mgmt | **npu(config)# show interfaces external-mgmt** |
| | bearer | **npu(config)# show interfaces bearer** |
| | local-mgmt | **npu(config)# show interfaces local-mgmt** |
| Virtual Interfaces | npu-host | **npu(config)# show interfaces npu-host** |
| | all-au | **npu(config)# show interfaces all-au** |

**IMPORTANT**

An error may occur if:

- The interface type or ID that you have specified does not exist.
- The IP interface does not exist for the configured connectivity and boot mode.

**Command Syntax**

```
npu# show interfaces [{[<interface-type> <interface-id>] | internal-mgmt
| external-mgmt | bearer | local-mgmt | npu-host | all-au }]
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [{[<interface-type> <interface-id>] \| **internal-mgmt** \| **external-mgmt** \| **bearer** \| **local-mgmt** \| **npu-host** \| **all-au** }] | Indicates the type of interface (physical, IP, or virtual) for which configuration information is to be displayed.<br>Do not specify any value for this parameter if you want to display configuration information for all physical, IP, and virtual interfaces. | Optional | N/A | Refer Table 4-14 |

| | |
|---|---|
| **Display Format (Physical Interfaces)** | <Port Number> <up/down>, line protocol is <up/down> (connected) MTU <value >bytes,<br><Full/half> duplex,<br><value> Mbps,  Auto-Negotiation<br>Octets : <value><br>Unicast Packets : <value><br>Broadcast Packets : <value><br>Multicast Packets : <value><br>Discarded Packets : <value><br>Error Packets : <value><br>Unknown Packets : <value><br>Octets : <value><br>Unicast Packets : <value><br>Broadcast Packets : <value><br>Multicast Packets : <value><br>Discarded Packets : <value><br>Error Packets : <value> |
| **Display Format (IP Interfaces)** | <IP Interface Name> <up/down>, MTU <value> bytes,<br><value> InBytes,<br><value> InUnicast Packets<br><value> InDiscarded Packets<br><value> InError Packets<br><value> OutBytes,<br><value> OutUnicast Packets |
| **Display Format (Virtual Interfaces)** | <Virtual Interface Name> interface<br>Acls attached <No. of attached ACLs> |
| **Command Modes** | Global command mode |

## 4.3.3 Managing the NPU Boot Mode

The NPU boot mode refers to the mode of operation to be used for operating the NPU. You can configure the NPU to be operated in any of the following boot modes:

- ASN-GW mode: In this mode, the NPU implements ASN-GW functionalities, that is, it implements R3 Reference Point (RP) towards the CSN, R4 reference point toward other ASN-GWs, and R6 reference point toward AU/BSs. The R8 reference point traffic is transparently relayed between AU/BSs (intra- or inter-shelf). The ASN-GW mode operates:
  - » With HA support, that is, the NPU implements Mobile IP services (MIP) Not supported in the current release.
  - » Without HA support, that is, the NPU does not implement MIP services

**IMPORTANT**

The ASN-GW mode without HA support is the default boot mode that is used when the NPU boots up for the first time.

- Transparent mode: In this mode, the NPU transparently relays R6 and R8 reference-point traffic between AU/BSs (intra- or inter-shelf).

This section describes the commands to be used for:


- "Configuring the Next Boot Mode" on page 163
- "Displaying the Current and Next Boot Mode Information" on page 165


### 4.3.3.1 Configuring the Next Boot Mode

The next boot mode refers to the boot mode that should be used for booting up the NPU the next time it is shut down or reset. The default boot mode is the ASN-GW mode without HA support.

The following are the possible boot modes for operating the NPU:

- ASN-GW mode with HA support (implements MIP services) (not supported in the current release)
- ASN-GW mode without HA support (does not implement MIP services)

- Transparent mode

**NOTE**

To view the NPU current and next boot mode, refer to "Displaying the Current and Next Boot Mode Information" on page 165.

To configure the next boot mode, run the following command:

```
npu(config)# nextbootmode {asngwMIP | asngwStatic | transparent}
```

**IMPORTANT**

It is recommended that you run this command to specify the boot mode to be used after the next NPU reset. If you do not specify the next boot mode, the NPU boots up using the last configured boot mode.

| | |
|---|---|
| **Command Syntax** | `npu(config)# nextbootmode {asngwMIP \| asngwStatic \| transparent}` |
| **Privilege Level** | `10` |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{asngwMIP \| asngwStatic \| transparent}` | Indicates the mode that is to be used for rebooting the NPU. | Mandatory | asngwStatic | ■ asngwMIP: Indicates that the ASN-GW boot mode with HA support. This is not supported in the current release.<br>■ asngwStatic: Indicates that the ASN-GW boot mode without HA support. That is, the system will not implement MIP services. This is the default mode of operation.<br>■ transparent: Indicates transparent boot mode. |

**Command Modes** Global configuration mode

### 4.3.3.2 Displaying the Current and Next Boot Mode Information

To display the current and next boot modes, run the following command:

**`npu# show bootmode`**

| | |
|---|---|
| **Command Syntax** | **npu# show bootmode** |
| **Privilege Level** | **1** |
| **Display Format** | `current bootmode : <Current Boot Mode>`<br>`next bootmode : <Configured Next Boot Mode>` |
| **Command Modes** | Global command mode |

## 4.3.4 Managing the 4Motion Configuration File

4Motion configuration parameters are stored in a default configuration file that resides in the NPU flash. When you start 4Motion for the first time after installation and commissioning, the system boots up with the factory default configuration. After the system boots up, you can use the CLI to modify the values of parameters (for which default values exist), and specify values for the remaining parameters.

**IMPORTANT**

You can, at any time, restore factory default configuration parameters. If you have not saved configuration since the first time the system was started (after installation and commissioning), the system boots up with the factory default parameters at the next system reset.

You can also download the configuration file from an external TFTP server, and use the configuration parameters in this file to boot up the 4Motion system. In addition, you can batch-process commands.

**IMPORTANT**

It is recommended that you periodically save changes to configuration. (The saved configuration is written to a file that resides in the NPU flash.) If you have modified any configuration parameters at runtime, it is recommended that you save configuration before resetting/shutting down 4Motion. Unsaved configuration is lost after system reset or shut down.

It is recommended that you make periodic backups of the configuration file. You can either manually make a backup of this file or configure the system to automatically make a daily backup. You can, at any time, restore the configuration specified in the backup file or the factory default configuration.

This section describes the commands for:


- "Saving the Current Configuration" on page 167
- "Downloading the Configuration File from an External Server" on page 168
- "Making a Backup/Restoring the Configuration File" on page 169


### 4.3.4.1 Saving the Current Configuration

When you reset the 4Motion system, it always boots up using the last saved configuration. If you are starting 4Motion for the first time after installation and commissioning, it boots up using the factory default configuration. Thereafter, any changes to configuration (made at runtime using the CLI) should be saved; all unsaved changes are lost after system reset.

**IMPORTANT**

You can, at any time, revert to the factory default configuration. For more information about restoring factory default configuration, refer to Section 4.3.4.3.5. If you do not save configuration after first time start up of 4Motion, it boots up with the factory default configuration the next time the system is reset.

Run the following command to save the current configuration:

```
npu# write
```

The next time you reset the system, it boots up with the last saved configuration.

**IMPORTANT**

It is recommended that you save the current configuration before shutting down or resetting the system. The last saved configuration is used during system startup. Unsaved configuration is lost after system reset/shutdown. For more information about shutting down/resetting the system, refer to Section 4.2.

Run the following command to save the current configuration:

```
npu# write
```

After you run this command, the current system configuration is saved in the NPU flash.

| | |
|---|---|
| **Command Syntax** | `npu# write` |

| | |
|---|---|
| **Privilege Level** | **10** |
| **Command Mode** | Global command mode |

### 4.3.4.2 Downloading the Configuration File from an External Server

**IMPORTANT**

Before downloading the configuration file from an external server, you are required to configure the IP interfaces, internal-management, external-management, bearer, and local-management. For more information about configuring IP interfaces, refer the section, "Configuring Static Routes" on page 205.

You can download the configuration file from an external server, and use this file for booting up 4Motion. After downloading this file, reset the system. The system boots up with the downloaded configuration.

**IMPORTANT**

As soon as the system boots up with the downloaded configuration, the downloaded configuration file is deleted from the NPU flash. The system continues to operate using the downloaded configuration until the next system reset. After the system is reset, it boots up using the last saved configuration. To ensure that the downloaded configuration is used to boot up the system after reset, save the downloaded configuration using the following command:

```
npu# write
```

For more information about saving configuration, refer to Section 4.3.4.1.

Run the following command to download the configuration file from an external server:

```
npu# configfile download tftp://<ip-address>/<filename>
```

Reset 4Motion after you run this command. The system boots up with the downloaded configuration. To reset the system, run the following command:

```
npu(config)# reset
```

For more information about resetting 4Motion, refer to Section 4.2.2.1.

**NOTE**

An error may occur if:

- The file to be downloaded is not present in the appropriate path on the TFTP server.
- The file name that you have provided is in an invalid format. (The file to be downloaded should be a compressed zip file with the .gz extension.)

**Command Syntax**

```
npu# configfile download tftp://<ip-address>/<filename>
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ip-address> | Indicates the IP address of the TFTP server. | Mandatory | N/A | Valid IP address |
| <filename> | Indicates the name of the configuration file to be downloaded using the TFTP server. The file to be downloaded should be a compressed zip file. Always suffix the file name with **.gz**. | Mandatory | N/A | <filename>.gz |

**Command Modes**

Global command mode

## 4.3.4.3 Making a Backup/Restoring the Configuration File

You can make a backup of the current system configuration. You can either manually make a backup or configure the system to automatically make a daily backup of the current configuration. You can, at any time, restore configuration from the backup configuration file or revert to the factory default configuration.

**NOTE**

The system makes a backup (automatic daily backups or manual backup) of the current configuration. The backup files are stored in the path, tftpboot\management\configuration. The naming convention used for the backup configuration files is, **YYYYMMDDHHMM.cfg.gz**.

You can display the three most recent backup configuration files residing in the NPU flash. For details, refer to Section 4.3.4.3.6.

This section describes the commands for:


- "Making a Manual Backup of the Current Configuration" on page 170
- "Displaying the Status of the Manual Backup Procedure" on page 171
- "Making Automatic Backups of the Current Configuration" on page 171
- "Restoring the Configuration Defined in the Backup Configuration File" on page 172
- "Restoring the Factory Default Configuration" on page 173
- "Displaying the Currently Stored Backup Configuration Files" on page 173


### 4.3.4.3.1 Making a Manual Backup of the Current Configuration

To manually make a backup of the current configuration, run the following command:

```
npu# manual-backup
```

You can, at any time, view the status of the manual backup procedure. For details, refer to Section 4.3.4.3.2.

**IMPORTANT**

To enable the system to automatically make a backup of the current configuration, everyday, refer to Section 4.3.4.3.3.

| | |
|---|---|
| **Command Syntax** | `npu# manual-backup` |
| **Command Modes** | Global command mode |

#### 4.3.4.3.2 Displaying the Status of the Manual Backup Procedure

To display the current status of the manual backup procedure, run the following command:

```
npu# show manual-backup-status
```

**Command Syntax**

```
npu# show manual-backup-status
```

**Privilege Level**

1

**Display Format**

```
The Status of the File Backup operation is: <status-value>
```

Where `<status value>` may be any of the following:

- Generating (1)
- Copying (2)
- Compressing (3)
- Compression Failure (4)
- Copying Failed (5)
- Completed (6)

**Command Modes**

Global command mode

#### 4.3.4.3.3 Making Automatic Backups of the Current Configuration

You can enable the system to automatically make daily backups of the current configuration at a specific time. (You can also manually make a backup of the configuration. For details, refer to Section 4.3.4.3.1.)

**NOTE**

By default, the system makes a daily backup of the current configuration, at 00:00 hours.

To enable the system to make automatic backups of the current configuration, run the following command:

```
npu# auto-backup-time <time>
```

Specify the time in the 24-hour format. The system will automatically make a backup of the current configuration, everyday, at the time that you have specified.

**IMPORTANT**

You can restore the configuration from any of the backup configuration files residing in the NPU flash. For details refer to Section 4.3.4.3.4.

**Command Syntax**

**`npu# auto-backup-time`** `<time>`

**Privilege Level**

**`10`**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<time>` | Indicates the time at which the system should automatically create a backup of the current configuration, everyday. | Mandatory | 00:00 | HH:MM<br>(Enter the time in the 24-hour format) |

**Command Modes**

Global command mode

### 4.3.4.3.4 Restoring the Configuration Defined in the Backup Configuration File

You can, at any time, restore configuration from the backup configuration file. (To display a list of currently stored backup files, refer to Section 4.3.4.3.6.) Run the following command to specify the backup file to be restored:

**`npu# restore-from-local-backup`** `<local-restore-filename>`

**IMPORTANT**

After executing this command, reset the system to restore configuration from the backup configuration file. For more information about resetting the system, refer to Section 4.2.2.1.

**IMPORTANT**

If you have stored the backup file on an external server, you can download the backup file from the external server, and reset the system to apply the configuration defined in the downloaded file. For details about downloading the configuration file from an external server, refer Section 4.3.4.2.

**Command Syntax**

**npu# restore-from-local-backup** <local-restore-filename>

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <local-restore-filename> | Indicates the name of the backup configuration file to be used for restoring configuration. | Mandatory | N/A | Valid file name |

**Command Modes**

Global command mode

#### 4.3.4.3.5 Restoring the Factory Default Configuration

You can, at any time, run the following command to restore factory default configuration:

**npu# restore-factory-default**

**Command Syntax**

**npu# restore-factory-default**

**Privilege Level**

**10**

**Command Modes**

Global command mode

#### 4.3.4.3.6 Displaying the Currently Stored Backup Configuration Files

To display a list of backup configuration files that are currently residing on the NPU flash, run the following command:

**npu# show backup-configuration-files**

The three most recent backup configuration files are displayed.

| | |
|---|---|
| **Command Syntax** | **npu# show backup-configuration-files** |
| **Privilege Level** | **1** |
| **Display Format** | 1.<file name>.gz<br>2. <file name>.gz<br>3. <file name>.gz |
| **Command Modes** | Global command mode |

## 4.3.5 Batch-processing of CLI Commands

You can use the CLI to batch-process commands to be executed for configuring and monitoring 4Motion.

**IMPORTANT**

Before initiating batch-processing of commands, remember that:

- If an error occurs while executing any command, the batch-processing operation is aborted; all subsequent commands are not executed.
- If you want to execute a command that requires system reset, specify the save configuration and system reset commands at the end of the batch file. (For more details about saving configuration and resetting the system, refer to "Saving the Current Configuration" on page 167 and "Resetting the system" on page 127.

**To batch-process CLI commands:**

1. Ensure that the text file comprising the commands to be batch processed is present on the TFTP server to be used for downloading the batch file.
2. Run the following command to download the text file and initiate batch-processing of commands specified in this file:

```
npu# batch-run tftp://<ip-address>/<file name>
```

After you execute this command, the file is downloaded from the TFTP server, and the commands in the file are executed sequentially. After batch-processing of all commands in this file is complete, the downloaded file is deleted from the 4Motion system.

The following is a sample text file that contains a list of commands to be batch-processed:

```
config terminal
nextbootmode asngwMIP
limit cpu softlimit 80 hardlimit 85
bearerqos rule_1 0 3 5 data 1
config outer-dscp 3 vlan-priority 4 qos enable
exit
write
reset
```

**Command Syntax**

**npu# batch-run tftp://**<ip-address>/<file name>

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ip-address> | Indicates the IP address of the TFTP server to be used for batch-processing commands to be used for configuring and monitoring 4Motion. | Mandatory | N/A | Valid IP address |
| <file name> | Indicates the configuration file to be used for batch-processing the CLI commands. Always suffix the file name with .txt. | Mandatory | N/A | <filename>.txt |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

## 4.3.6 Configuring the CPU

To ensure optimal utilization of the NPU resources, you are required to configure the thresholds for the CPU and memory utilization for the NPU. In addition, to protect the from hostile applications, you can limit the type and rate of traffic destined towards the NPU.

This section describes the commands to be executed for:

- “Configuring CPU and Memory Utilization Thresholds for the NPU” on page 176
- “Configuring the Rate Limiting for the NPU” on page 178

### 4.3.6.1 Configuring CPU and Memory Utilization Thresholds for the NPU

This section describes the commands for:

- “Specifying Thresholds for CPU and Memory Utilization for the NPU” on page 176
- “Displaying CPU and Memory Utilization Limits for the NPU” on page 178

#### 4.3.6.1.1 Specifying Thresholds for CPU and Memory Utilization for the NPU

You can use the CLI to configure the thresholds (soft and hard limits) for CPU and memory utilization for the NPU. When the soft or hard limit for either CPU or memory utilization is reached, an alarm is raised.

**NOTE**

To display the current thresholds that are configured for CPU and memory utilization for the NPU, refer to Section 4.3.6.1.2.

To configure the thresholds (soft and hard limits) for CPU and memory utilization for the NPU, run the following command:

```
(config)# limit {cpu | memory} ([softlimit <limit>] [hardlimit <limit>])
```

For example, run the following command if you want to configure the soft and hard limits for CPU utilization to be 78 and 85 percent, respectively.

```
npu(config)# limit cpu softlimit 80 hardlimit 85
```

**NOTE**

An error may occur if the value of the `softlimit` parameter is higher than the `hardlimit` parameter.

**Command Syntax**

**`npu(config)# limit {cpu | memory} ([softlimit <limit>] [hardlimit <limit>])`**

**Privilege Level**

**`10`**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{cpu \| memory}` | Indicates whether the threshold is to be specified for CPU or memory utilization. | Mandatory | N/A | cpu/ memory |
| `[softlimit <limit>]` | Indicates the soft limit, as a percentage, for CPU/memory utilization. When this limit is reached, the system raises a Minor or Major alarm. | Optional | 80 (for CPU and memory utilization) | 1-100 |
| `[hardlimit <limit>])` | Indicates the hard limit for CPU/memory utilization. When this limit is reached, the system raises a Critical alarm.<br>The value of this parameter should always be greater than the `softlimit` parameter. | Optional | 90 (for CPU and memory utilization) | 1-100 |

**Command Modes**

Global configuration mode

#### 4.3.6.1.2 Displaying CPU and Memory Utilization Limits for the NPU

To display the configured CPU and memory utilization limits for the NPU, run the following command:

```
npu# show resource limits
```

**NOTE**

To configure the CPU and memory utilization limits for the NPU, refer to Section 4.3.6.1.2.

| | |
|---|---|
| **Command Syntax** | `npu# show resource limits` |
| **Privilege Level** | `10` |
| **Display Format** | `Resource  softlimit  hardlimit`<br>`CPU  <limit>  <limit>`<br>`Memory  <limit>  <limit>` |
| **Command Modes** | Global configuration mode |

### 4.3.6.2 Configuring the Rate Limiting for the NPU

The rate limiting feature enables you to limit the type of traffic destined towards the NPU. This feature is used to protect the NPU from hostile applications or Denial of Service (DoS) attacks because packets that exceed an allowed rate are dropped and not queued to the NPU.

The following are pre-defined applications for which rate limiting is already configured:

- File Transfer protocol (FTP)
- Telnet
- Trivial File Transfer Protocol (TFTP)
- SSH

- Internet Control Protocol Message (ICMP)
- Simple Network Management Protocol (SNMP)
- R6, R4
- Internet Group Management Protocol (IGMP)
- Extensible Authentication Protocol (EAP)
- Address Resolution Protocol (ARP)

**NOTE**

Rate limiting for pre-defined applications is only configured for control traffic from FTP, Telnet, and TFTP applications. You need to configure rate limiting separately for data traffic from FTP, Telnet, and TFTP. For details, refer to "Configuring Rate Limiting for User-defined Applications" on page 183.

You can, at any time, modify the rate limit parameters for pre-defined applications. Besides the pre-defined applications, you can also configure rate limiting for other applications.

**IMPORTANT**

100 Kbps is the default rate limit that is configured for pre-defined and user-defined applications. In addition, 100 Kbps is the default rate limit that is specified for all other applications that may send packets to the NPU (but are not in the list of pre-defined or user-defined applications).

If you disable rate limiting for a specific pre-defined or user-defined application, the rate limit that you have configured for all other applications will be applicable for the application (for which rate-limiting is disabled.

You can, at any time, view configuration information for the rate limiting feature.

**To configure rate limiting for the NPU:**

1. Enable the rate limiting configuration mode (refer to Section 4.3.6.2.1)
2. You can now execute any of the following tasks:
   - » Modify default rate limiting configuration for pre-defined applications (refer to Section 4.3.6.2.2)

- Configure rate limiting for user-defined applications (refer to Section 4.3.6.2.3)
- Disable rate limiting for specific applications (refer to Section 4.3.6.2.4)

You can, at any time, enable or disable rate limiting (refer to Section 4.3.6.2.5). In addition, you can also display configuration information for the rate limiting feature (refer to Section 4.3.6.2.6).

**NOTE**

In addition, you can also display the number of non-conforming packets dropped by the rate limiting feature. For details, refer to Section 4.9.1.4.

### 4.3.6.2.1 Enabling the Rate Limiting Configuration Mode

To enable the rate limiting configuration mode, run the following command:

```
npu(config)# rate-limit config
```

After you run this command, you can:

- Modify default rate limiting configuration parameters for pre-defined applications (refer to Section 4.3.6.2.2)
- Configure rate limiting for user-defined applications (refer to Section 4.3.6.2.3)
- Disable rate limiting for specific applications (refer to Section 4.3.6.2.4)

| | |
|---|---|
| **Command Syntax** | `npu(config)# rate-limit config` |
| **Privilege Level** | `10` |
| **Command Modes** | Global configuration mode |

### 4.3.6.2.2 Modifying Configuration Parameters for Pre-defined Applications

Rate limiting is configured and enabled for the following pre-defined applications:

- FTP
- Telnet

- TFTP
- SSH
- ICMP
- SNMP
- R6, R4
- IGMP
- EAP
- ARP

**NOTE**

To configure user-defined applications, refer to Section 4.3.6.2.3.

Run the following command to modify the rate limiting configuration parameters for a pre-defined application. You can also use this command to configure rate limiting for all other applications that may send packets to the NPU.

**npu(config-ratelmt)# set rate-limit** {**ftp** | **telnet** | **tftp** | **ssh** | **icmp** | **snmp** | **R4-R6** | **igmp** | **eap** | **arp** | **all-others**} [**dstport** <port_num>] <rate-Kbps>

**IMPORTANT**

Rate limiting for pre-defined applications is only configured for control traffic from FTP, Telnet, and TFTP applications. You need to configure rate limiting seaparately for data traffic from FTP, Telnet, and TFTP applications. For details, refer to “Configuring Rate Limiting for User-defined Applications” on page 183.

**NOTE**

By default, the NPU listens for packets from pre-defined applications on standard ports.

For example, run the following command to specify that NPU should listen for FTP packets on port 1024 a packet rate of 300 Kbps.

**npu(config-ratelmt)# set rate-limit ftp dstport 1024 300**

**Command Syntax**

```
npu(config-ratelmt)# set rate-limit {ftp | telnet | tftp | ssh | icmp |
snmp | R4-R6 | igmp | eap | arp | all-others} [dstport <port_num>]
<rate-Kbps>
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {ftp \| telnet \| tftp \| ssh \| icmp \| snmp \| R4-R6 \| igmp \| eap \| arp \| all-others} | Indicates the application for which the rate limiting is to be configured. | Mandatory | N/A | ■ ftp<br>■ telnet<br>■ tftp<br>■ ssh<br>■ icmp<br>■ snmp<br>■ R4-R6<br>■ igmp<br>■ eap<br>■ arp<br>■ all-others: Refers to all other applications that may send packets to the NPU, and are not in the list of pre-defined or user-defined applications. |

| | | | | | |
|---|---|---|---|---|---|
| | [dstport <port_num>] | Indicates the TCP/UDP port on which the NPU listens for packets from a pre-defined application. | Optional | Standard ports | 1-65535 |
| | [rate-Kbps] | Indicates the rate, in Kbps, at which a pre-defined application can send packets to the NPU. | Mandatory | 100 | 1-1000000 |

**Command Modes** Rate limiting configuration mode

### 4.3.6.2.3 Configuring Rate Limiting for User-defined Applications

Besides the pre-defined applications (refer to Section 4.3.6.2.2), you can also configure other applications that can send packets to the NPU.

Run the following command to configure rate limiting for a user-defined application.

```
npu(config-ratelmt)# set rate-limit <user-defined-app> {[srcport
<port_num>] [dstport <port_num>] [protocol <protocol_num>] [srcaddr
<ip_addr>] [dstaddr <ip_addr>] [ethertype <protocol_num>]}
<rate-Kbps>
```

In the above command, it is recommended that you configure at least one of the following parameters. The more parameters you configure, the higher the granularity of the rate limiting definition for that application.

**NOTE**

To display the rate limiting parameters defined for user-defined and other applications, refer to Section 4.3.6.2.6

- L4 source port
- L4 destination port
- L3 protocol field
- Source IP address
- Destination IP address
- L2 protocol type field

**IMPORTANT**

While configuring rate limiting for user-defined applications, remember that:

- Configuration for user-defined applications is applied with respect to the sequence in which you configure these values. It is recommended that you specify the more granular definitions before the less granular ones. For example, if you are creating a definition that configures the source port 200 and destination port 500, create this definition before creating a generic configuration for applications with source port 200. Otherwise, packets with source port 200 and destination port 500 will be limited according to the rate configured for source port 200.
- Packets are classified and identified by the hardware with respect to the depth of the fields that are configured. Specify the values of the rate limiting parameters for user-defined applications exactly as these appear in the packet header.
- You cannot modify rate limiting definitions for a user-defined application. To modify rate limiting configuration for a user-defined application, disable and delete that definition, and then create a new one using the command described in this section. To disable an application definition, refer to Section 4.3.6.2.4.
- L2 protocols cannot be defined with any of the other L4 or L3 fields mentioned above.
- The destination IP address that you specify should be the IP address that you have configured for the external-management, internal-management, bearer, and local-management interface.

**IMPORTANT**

An error may occur when you run this command and:

- The destination port, protocol fields, or Ethernet type that you have configured for the user-defined application is identical to the destination port of the pre-defined application.
- Rate limiting is completely disabled for the NPU.

**Command Syntax**

```
npu(config-ratelmt)# set rate-limit <user-defined-app> {[srcport
<port_num>] [dstport <port_num>] [protocol <protocol_num>] [srcaddr
<ip_addr>] [dstaddr <ip_addr>] [ethertype <protocol_num>]} <rate-Kbps>
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <user-defined-app> | Indicates the name of the application. | Mandatory | N/A | String (up to 20 characters) |

| | | | | | |
|---|---|---|---|---|---|
| | [srcport <port_num>] | Indicates the L4 source port of the user-defined application. specify the value of this parameter exactly as this field appears in the TCP/UDP header. | Optional | N/A | 1-65535 |
| | [dstport <port_num>] | Indicates the L4 destination port of the user-defined application. This parameter should be specified exactly as it appears in the TCP/UDP header. | Optional | N/A | 1-65535 |
| | [protocol <protocol_num> ] | Indicates the L3 protocol field of the user-defined application. This parameter should be specified exactly as it appears in the IP header | Optional | N/A | 0-255 |
| | [srcaddr <ip_addr>] | Indicates the source IP address of the user-defined application. | Optional | N/A | Valid unicast IP address |
| | [dstaddr <ip_addr>] | Indicates the pre-configured destination IP address for the NPU for which rate limiting for this user-defined application is to be configured. Specify the IP address that is assigned to the external-management, internal-management, local-management or bearer interface. | Optional | N/A | Valid unicast IP address |
| | [ethertype <protocol_num> ] | Indicates the Ethernet type field of the user-defined L2 protocol. | Optional | N/A | 1536-65535 |
| | [rate-Kbps] | Indicates the rate, in Kbps, at which an application can send packets to the NPU. | Mandatory | 100 | 1-1000000 |

**Command Modes** Rate limiting configuration mode

#### 4.3.6.2.4 Disabling and Deleting Rate Limiting Configuration for an Application

To disable and delete rate limiting configuration for an application, run the following command:

```
npu(config-ratelmt)# no rate-limit {ftp | telnet | tftp | ssh |
icmp | snmp | R4-R6 | igmp | <user-defined-app>}
```

**IMPORTANT**

While disabling rate limiting for user-defined applications, remember that:

- Rate limiting configuration specified for applications categorized as 'all-others' is applicable for all pre-defined/user-defined applications for which you have disabled rate limiting. (However, if you disable rate-limiting for the entire system, it is disabled completely across pre-defined, user-defined, and all other applications. For details, refer to Section 4.3.6.2.5.)
- After rate limiting is disabled for an application, the application traffic is identical to that of other applications (applications other than pre-defined and user defined applications.)
- You cannot disable rate limiting for EAP and ARP.
- An error may occur if you try disabling rate limiting for an application when this feature is already disabled for the entire system. For details, refer to Section 4.3.6.2.5.

| | |
|---|---|
| **Command Syntax** | `npu(config-ratelmt)# no rate-limit {ftp \| telnet \| tftp \| ssh \| icmp \| snmp \| R4-R6 \| igmp \| <user-defined-app>}` |
| **Privilege Level** | `10` |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{ftp \| telnet \| tftp \| ssh \| icmp \| snmp \| R4-R6 \| igmp \| eap \| arp \| <user-defined-app>}` | Indicates the application for which rate limiting is to be disabled. | Mandatory | N/A | ■ ftp<br>■ telnet<br>■ tftp<br>■ ssh<br>■ icmp<br>■ snmp<br>■ R4-R6<br>■ igmp<br>■ eap<br>■ arp<br>■ user-defined-app: Refers to user-defined applications for which rate limiting is to be disabled. |

**Command Modes**

Rate limiting configuration mode

### 4.3.6.2.5 Enabling/Disabling the Rate Limiting for the NPU

You can disable or enable the rate limiting feature for the NPU. When this feature is disabled, rate-limiting for all applications is in the "not-in-service" state. When you enable this feature, the last saved configuration parameters for all applications (pre-defined, user-defined, and all others) is used.

By default, this feature is enabled for the NPU.

**CAUTION**

When you disable rate limiting for the entire system, it is disabled for all applications, pre-defined, user-defined, and all others, and any application can use 100% of the NPU's capacity, thereby making it vulnerable to attack from hostile applications. To disable rate limiting for a specific user-defined and pre-defined application, refer Section 4.3.6.2.2 and Section 4.3.6.2.3.

To enable/disable the rate limiting feature, run the following command:

**npu(config)# set cpu rate-limit {enable | disable}**

**Command Syntax** **npu(config)# set cpu rate-limit {enable | disable}**

**Privilege Level** **10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {enable \| disable} | Indicates whether this feature should be enabled or disabled for the NPU. | Mandatory | N/A | ■ enable<br>■ disable |

**Command Modes** Global configuration mode

### 4.3.6.2.6 Displaying the Rate Limiting Configuration Information for an Application

To display rate limiting parameters that are configured for specific or all user-defined and pre-defined applications, run the following command:

**npu# show rate-limit config {ftp | telnet | tftp | ssh | icmp | snmp | R4-R6 | igmp | eap | arp | all-others | <user-defined-app> | all}**

**IMPORTANT**

An error may occur if you want to run this command to display configuration information for an application for which rate limiting is disabled.

**Command Syntax** **npu# show rate-limit config {ftp | telnet | tftp | ssh | icmp | snmp | R4-R6 | igmp | eap | arp | all-others | <user-defined-app> | all}**

**Privilege Level** 1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{ftp \| telnet \| tftp \| ssh \| icmp \| snmp \| R4-R6 \| igmp \| eap \| arp \| <user-defined-app> \| all}` | Indicates the application for which rate limiting is to be displayed. | Optional | N/A | ■ ftp<br>■ telnet<br>■ tftp<br>■ ssh<br>■ icmp<br>■ snmp<br>■ R4-R6<br>■ igmp<br>■ eap<br>■ arp<br>■ user-defined-app: Refers to user-defined applications for which rate limiting is to be displayed.<br>■ all |

**Display Format**

```
CPU Rate Limiting Status : Enabled

PRE-DEFINED RATELIMIT CONFIGURATION:

-----------------------------------

Application   DestPort      Rate(Kbps)    Status

<Application>  <Port Number>  <Configured Rate> <Current Status>

<Application>  <Port Number>  <Configured Rate> <Current Status>

<Application>  <Port Number>  <Configured Rate> <Current Status>


USER-DEFINED RATELIMIT CONFIGURATION:

Application  Srcport    Dstport     Proto       SrcIPAddr   DstIPAddr
L2type    Rate

<Application> <Port Number> <Port Number>  <Protocol>    IP address> <IP
Address>   <value>    <Configured Rate>
```

**Command Modes**

Global command mode

## 4.3.7 Configuring QoS Marking Rules

QoS marking rules refer to the classification of traffic originating from the NPU into different flows. You can then apply DiffServ Code Points (DSCP) and/or 802.1p priority bits for appropriate QoS handling of each flow.

The NPU generates the following types of traffic:

- R4/R6 control traffic
- R3 control traffic such as RADIUS or MIP
- NMS traffic

To define QoS for traffic generated by NPU, you are required to configure:

- Class-maps: Define the DSCP and VLAN priority bits to be applied for signaling and management traffic originating from the NPU.
- QoS classification rules: Classify packets into flows, based on the IP address of the host interface, transport protocol, and the source port number of the application traffic. A class-map can be associated with each flow to define

separate DSCP and VLAN priority bits for QoS handling of each flow. You can use extended ACLs to configure a classification rule, and associate it with a class-map.

**IMPORTANT**

You can use extended ACLs to also filter traffic destined towards the NPU. For details, refer "Configuring ACLs" on page 209).

**IMPORTANT**

By default, QoS marking rules are disabled. You are required to enable a QoS marking rule before it is applied on host originating traffic matching the QoS classification rules.

**To configure QoS marking rules:**

1. Create one or more class-maps (refer Section 4.3.7.1)
2. Use extended ACLs to configure QoS classification rules, and apply the appropriate class-map for each classifcation rule (refer Section 4.3.7.2).
3. Enable the QoS marking rule to classify packets based on the QoS classifcation criteria, and apply the apprpriate class-map (refer Section 4.3.7.3)

You can, at any time, display configuration information for a particular class-map (refer Section 4.3.7.1.6).

## 4.3.7.1 Managing Class-maps

A class-map refers to the DSCP and 802.1p VLAN priority bits to be applied on host-originating traffic that match the criteria defined by the QoS classification rules. Each class-map is assigned a class-identifier, which you can use to reference a class-map (while associating it with the ACL that defines the QoS classification rule).

**To configure a class-map:**

1. Enable the QoS class-map configuration mode (refer Section 4.3.7.1.1)
2. You can now:
   - » Configure the 802.1p VLAN priority and/or DSCP for this class-map (refer Section 4.3.7.1.2).

» Delete the 802.1p VLAN priority and/or DSCP for this QoS class-map (refer Section 4.3.7.1.3).

3 Terminate the QoS class-map configuration mode (refer Section 4.3.7.1.4).

You can, at any time, delete an existing class-map (refer Section 4.3.7.1.5) or view the configuration information for an existing class-map (refer Section 4.3.7.1.6).

#### 4.3.7.1.1 Enabling the QoS Class-map Configuration Mode/ Creating a New Class Map

To specify the 802.1p VLAN priority and DSCP values for a class-map, first enable the QoS class-map configuration mode. Run the following command to enable the QoS class-map configuration mode. You can use this command to create a new QoS class-map

```
npu(config)# class-map <class-map-number(1-65535)>
```

If you run the above command to create a new QoS class-map, the configuration mode for this QoS class-map is automatically enabled.

By default, class-maps 1-9 are pre-configured. The following table lists the default DSCP and 802.1p VLAN priority bits that are configured for class-maps 1-9:

**Table 4-15: Default QoS Class-maps 1-9**

| Class Map | DSCP | 802.1p priority | Type of Traffic | Source Port | IP Interface |
|---|---|---|---|---|---|
| 1 | 7 | 7 | RADIUS packets generated from the NPU | 1812 | Bearer |
| 2 | 7 | 7 | MIP packets generated from the NPU | 434 | Bearer |
| 3 | 7 | 7 | R4/R6 control packets generated from the NPU | 2231 | Bearer |
| 4 | 0 | 0 | Telnet on internal management | 23 | Internal-management |
| 5 | 0 | 0 | SSH on internal management | 22 | Internal-management |
| 6 | 0 | 0 | SNMP on internal management | 161 | Internal-management |
| 7 | 0 | 0 | Telnet on external management | 23 | External-management |
| 8 | 0 | 0 | SSH on external management | 22 | External-management |

**Table 4-15: Default QoS Class-maps 1-9**

| | | | | | |
|---|---|---|---|---|---|
| 9 | 0 | 0 | SNMP on external management | 161 | External-management |

**IMPORTANT**

If you want to modify the 802.1p VLAN priority and DSCP values for a class-map that is already associated with an ACL, first disable the QoS marking rule for that ACL. For more information about disabling QoS marking rules, refer Section 4.3.7.3.

**NOTE**

The QoS class-map number is used to reference the QoS class-map that you want to associate with an ACL, which defines the classification rule to be applied for host-originating traffic. For more information about creating QoS classification rules, refer Section 4.3.7.2.

After you enable the QoS class-map configuration mode, you can:

- Configure the 802.1p VLAN priority and/or DSCP for this class-map (refer Section 4.3.7.1.2).
- Delete the 802.1p VLAN priority and/or DSCP for this QoS class-map (refer Section 4.3.7.1.3).

**IMPORTANT**

An error may occur if:

- You specify a class-map number that is not within the range, 1- 65535.
- The class-map configuration mode for the class-map you have specified is already enabled.
- The class-map number for which you are trying to enable the class-map configuration mode does not exist.

**Command Syntax**

```
npu(config)# class-map <class-map-number(1-65535)>
```

**Privilege Level**

```
10
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<class-map-number(1-65535)>` | Indicates the identifier of the QoS class-map for which the QoS class-map configuration mode is to be enabled. | Mandatory | N/A | 1-65535 |

**Command Modes**

Global configuration mode

### 4.3.7.1.2 Specifying 802.1p VLAN priority and DSCP for a Class-map

**IMPORTANT**

If you are modifying the 802.1p VLAN priority and DSCP for a class-map that is associated with an ACL, first disable the QoS marking rule for that ACL. For details, refer Section 4.3.7.3.

After enabling the QoS class-map configuration mode, you can configure following values for this QoS class-map:

- DSCP value in the IPv4 packet header to indicate a desired service
- 802.1p VLAN priority in the VLAN header of the packet

Run the following command to configure the 802.1p VLAN priority and/or DSCP:

```
npu(config-cmap)# set {[cos <new-cos(0-7)>] [ip dscp
<new-dscp(0-63)>]}
```

**Command Syntax**

```
npu(config-cmap)# set {[cos <new-cos(0-7)>] [ip dscp <new-dscp(0-63)>]}
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [**cos** <new-cos(0-7)>] | Indicates the 802.1p VLAN priority value to be applied for this class-map. | Optional | N/A | 0-7 where 0 is the lowest and 7 is the highest |
| [**ip dscp** <new-dscp(0-63)>] | Indicates the DSCP value to be applied for this class-map. | Optional | N/A | 0-63 |

**Command Modes**

Class-map configuration mode

### 4.3.7.1.3 Deleting 802.1p and DSCP Values from a Class-map

**IMPORTANT**

If you are deleting the 802.1p VLAN priority and DSCP for a class-map that is associated with an ACL, first disable the QoS marking rule for that ACL. For details, refer Section 4.3.7.3.

Run the following command to delete the 802.1p VLAN priority and/or DSCP for this class-map.

```
npu(config-cmap)# no {[cos <new-cos(0-7)>] [ip dscp
<new-dscp(0-63)>]}
```

**IMPORTANT**

An error may occur if the 802.1p or DSCP that you have specified do not exist for this class-map.

**Command Syntax**

```
npu(config-cmap)# no {[cos <new-cos(0-7)>] [ip dscp <new-dscp(0-63)>]}
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[cos <new-cos(0-7)> ]` | Indicates the 802.1p VLAN priority to be deleted for this class-map. | Optional | N/A | 0-7 |
| `[ip dscp <new-dscp(0-63)>]` | Indicates the DSCP to be deleted for this class-map. | Optional | N/A | 0-63 |

**Command Modes**

QoS class-map configuration mode

#### 4.3.7.1.4 Terminating the QoS Class-map Configuration Mode

To terminate the QoS class-map configuration mode, run the following command:

```
npu(config-cmap)# exit
```

**Command Syntax**

```
npu(config-cmap)# exit
```

**Privilege Level**

10

**Command Modes**

QoS class-map configuration mode

#### 4.3.7.1.5 Deleting a QoS Class-map

Run the following command to delete an existing QoS class-map:

```
npu(config)# no class-map <class-map-number(1-65535)>
```

**IMPORTANT**

An error may occur if you specify a class-map number that does not exist or is not within the range, 1-65535.

**Command Syntax**

```
npu(config)# no class-map <class-map-number(1-65535)>
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <class-map-number(1-65535)> | Indicates the identifier of the QoS class-map number to be deleted. | Mandatory | N/A | 1-65535 |

**Command Modes**

Global configuration mode

### 4.3.7.1.6 Displaying Configuration Information for a Class-map

Run the following command to view the configuration information for a class-map:

**npu# show class-map** [<class-map-num(1-65535)>]

Specify the class-map number if you want to view configuration information for a specific class-map. If you do not specify the class-map number, configuration information for all class-maps is displayed.

**IMPORTANT**

An error may occur if you specify a class-map number that does not exist or is not within the range, 1-65535.

**Command Syntax**

**npu# show class-map** [<class-map-num(1-65535)>]

**Privilege Level**

**1**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<class-map-num(1-65535)>] | Indicates the identifier of the class-map for which configuration information is to be displayed. Do not specify a value for this parameter if you want to view the configuration information for all class-maps. | Optional | N/A | 1-65535 |

**Display Format**

```
DiffServ Configurations:
-----------------------------------------
Quality of Service has been <enabled/disabled>
Class map <class map number>
-----------------------------------------
CoS Value                  : <value>
DSCP Value                 : <value>Class map <class map number>
-----------------------------------------
CoS Value                  : <value>
DSCP Value                 : <value>
```

**Command Modes**

Global command mode

## 4.3.7.2 Managing QoS Classification Rules

QoS classification rules classify packets into flows, based on the following parameters:

- IP address of the host (for example, the IP address assigned to the bearer, internal-management or external-management interface
- Layer 3 protocol indicating either TCP or UDP
- Layer 4-destination port for the application that needs to be marked (for example, FTP, Telnet, SNMP, MIP, or RADIUS)

A class-map can be associated with each flow to define separate DSCP and VLAN priority bits for QoS handling of each flow. You can use extended ACLs to configure a classification rule, and associate it with a class-map.

**IMPORTANT**

QoS classification rules can be associated with only extended ACLs.

**To configure a QoS classification rule:**

1. Enable the ACL configuration mode (refer Section 4.3.7.2.1).
2. You can now:
   - » Configure the QoS classification rule for this ACL (refer Section 4.3.7.2.2)
   - » Delete the QoS classification rule for this ACL (refer Section 4.3.7.2.3)
3. Terminate the ACL configuration mode (refer Section 4.3.7.2.4).

### 4.3.7.2.1 Enabling the ACL Configuration Mode/ Creating a New ACL

To configure QoS classification rules for host-originating traffic, first enable the extended ACL configuration mode.

**IMPORTANT**

QoS classification rules can be added only to extended ACLs

Run the following command to enable the extended ACL configuration mode. You can also run this command to

```
npu(config)# ip access-list { standard <access-list-number (1-99)>
| extended <access-list-number (100-199)> } [name<string>]
```

After you enable the ACL configuration mode, you can configure the QoS classification rule for a particular ACL, and associate it the appropriate class-map.

**IMPORTANT**

An error may occur if:

- You specify an incorrect ACL number. You can specify an ACL number between 100 and 199 in the extended mode.·
- The ACL name you have specified is does not exist or is more than 20 characters.

**Command Syntax**

```
npu(config)# ip access-list { standard <access-list-number (1-99)> |
extended <access-list-number (100-199)> } [name <string>]
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| **extended** <access-list-number (100-199)> | Indicates the identifier of the extended ACL for which the ACL configuration mode is to be enabled. | Mandatory | N/A | 100-199 |
| [name <string>] | Indicates the name of the ACL for which the ACL configuration mode is to be enabled.<br>**Note**: If you do not specify the ACL name, the ACL number is used as the default ACL name. | Optional | N/A | String (upto 20 characters) |

**Command Modes**

Global configuration mode

### 4.3.7.2.2 Configuring a QoS Classification Rule

**IMPORTANT**

You can configure QoS classification rules for ACLs that are INACTIVE. For more information about inactivating an ACL. refer Section 4.3.9.3.

You can configure the QoS classification rules for the ACL with respect the following parameters:

- Source IP address for the host-originating application traffic
- Application protocol (TCP or UDP)
- L4 source port of the application traffic
- QoS class-map identifier

After configuring QoS classification rules for this ACL, enable QoS marking rule for this ACL. By default, QoS marking rules are disabled for ACLs. For details, refer Section 4.3.7.3.

Run the following command to configure a QoS classification rule for this ACL:

```
npu(config-ext-nacl)# qos-mark {{host <src-ip-address>} {{tcp | udp} srcport <short (1-65535)>} qosclassifier <short (1-65535)>}
```

When you execute this command, a new QoS classification rule is added to the ACL for which the configuration mode is enabled.

**IMPORTANT**

An error may occur if:

- You have specified a source port that is not within the range, 1-65535.
- The host IP address or class-map that you have specified do not exist.
- You have specified a QoS class-map identifier that does not exist.
- The ACL for which you are configuring the QoS classification rule is currently ACTIVE. The ACL should always be INACTIVE when you configure QoS classification rules.

| | |
|---|---|
| **Command Syntax** | `npu(config-ext-nacl)# qos-mark {{host <src-ip-address>} {{tcp \| udp} srcport <short (1-65535)>} qosclassifier <short (1-65535)>}` |
| **Privilege Level** | `10` |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{host <src-ip-address>}` | Indicates the IP address of the host interface that generates the traffic for which this classification rule is to be configured. Specify the IP address that you have assigned to the internal-management, external-management or bearer IP interface. | Mandatory | N/A | Valid IP address (assigned to the internal-management, external-management or bearer IP interface) |
| `{tcp \| udp}` | Indicates the transport protocol. | Mandatory | N/A | ■ tcp<br>■ udp |
| `srcport <short (1-65535)>` | Indicates the source port number of the application traffic for which this QoS classification rule is to be applied. | Mandatory | N/A | 1-65535 |
| `qosclassifier <class-map-number (1-65535)>` | Indicates the identifier of the QoS class-map to be associated with this classification rule. For more information about configuring class-maps, refer Section 4.3.7.1. | Mandatory | N/A | 1-65535 |

**Command Modes**

Extended ACL configuration mode

### 4.3.7.2.3 Deleting a QoS Classification Rule

**IMPORTANT**

You can delete a QoS classification rule only if the associated ACL is INACTIVE. For more information, refer Section 4.3.9.3.

To delete a QoS classification rule for an ACL, run the following command:

```
npu(config-ext-nacl)# no qos-mark {{host <src-ip-address>} {{tcp | udp} srcport <short (1-65535)>} qosclassifier <short (1-65535)>}
```

When you execute this command, a new QoS classification rule is added to the ACL for which the configuration mode is enabled.

**IMPORTANT**

An error may occur if you specify:

- 0 as the value for the source IP address.
- A QoS class-map identifier that does not exist or is not within the range, 1-65535.

**Command Syntax**

```
npu(config-ext-nacl)# no qos-mark {{host <src-ip-address>} {{tcp | udp}
srcport <short (1-65535)>} qosclassifier <short (1-65535)>}
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [host <src-ip-address>] | Indicates the IP address of the host interface that generates the traffic for which this classification rule is to be deleted. | Mandatory | N/A | Valid IP address (assigned to the internal-management, external-management or bearer IP interface) |
| {tcp \| udp} | Indicates the transport protocol. | Mandatory | N/A | ■ tcp<br>■ udp |
| srcport <short (1-65535)> | Indicates the source port number of the application traffic for which this QoS classification rule is to be deleted. | Mandatory | N/A | 1-65535 |

| | | | | | |
|---|---|---|---|---|---|
| | `qosclassifier <class-map-number (1-65535)>` | Indicates the identifier of the QoS class-map associated with the classification rule to be deleted. For more information about class-maps, refer Section 4.3.7.1. | Mandatory | N/A | 1-65535 |

| | |
|---|---|
| **Command Modes** | Extended ACL configuration mode |

#### 4.3.7.2.4 Terminating the ACL Configuration Mode

To terminate the ACL configuration mode, run the following command:

```
npu(config-ext-nacl) # exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-ext-nacl) # exit` |
| **Privilege Level** | 10 |
| **Command Modes** | Extended ACL configuration mode |

### 4.3.7.3 Enabling/Disabling a QoS Marking Rule for an ACL

You can enable/disable a QoS marking rule separately for each ACL. The class-map is applied on traffic matching a QoS classification rule only after you enable the QoS marking rule for an ACL (that defines the QoS classification rule).

**IMPORTANT**

You cannot associate a Qos marking rule with an ACL for which Permit or Deny rules are configured. You can either associate QoS marking rules or permit/deny rules with an ACL. By default, ACL 199 is reserved for QoS marking rules.

**NOTE**

If you want to modify a QoS class-map, first disable the QoS marking rule for the associated ACL. By default, QoS marking rules are disabled for an ACL.

Run the following command to enable/disable the QoS marking rule for the specified ACL:

```
npu(config)# set qos { enable | disable } {<acl_number(100-199)>}
```

**IMPORTANT**

An error may occur if:

- The QoS marking rule to be disabled is not associated with the ACL you have specified.
- The ACL that you have specified is not within the range, 100-199.

**Command Syntax**

```
npu(config)# set qos { enable | disable } {<acl_number(100-199)>}
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{ enable \| disable }` | Indicates whether QoS marking rule should be enabled or disabled for a specific ACL. | Mandatory | disable | ■ enable<br>■ disable |
| `{<acl_number(100-199)>}` | Indicates the identifier of the ACL for which the QoS marking rule is to be activated. | Mandatory | N/A | 100-199 |

**Command Modes**

Global configuration mode

## 4.3.8 Configuring Static Routes

Using the CLI, you can configure the static routes for traffic originating from the NPU. For each static route, you can configure the destination IP address, address mask, and the next hop IP address. The following are the types of traffic originating from the NPU:

- R4/R6 control traffic
- R3 control traffic such as RADIUS or MIP

- NMS traffic

This section describes the commands for:


- "Adding a Static Route" on page 206
- "Deleting a Static Route" on page 207
- "Displaying the IP Routing Table" on page 208


### 4.3.8.1 Adding a Static Route

To add a static route, run the following command:

```
npu(config)# ip route <ip_address> <ip_mask> <ip_nexthop>
```

**NOTE**

Refer to Section 4.3.8.3 to display the IP routing table.

For example, run the following command to add an entry for a static route with the destination IP address, 11.0.0.2, and the address mask, 255.255.255.255, and next-hop IP address, 192.168.10.1.

```
npu(config)# ip route 11.0.0.2 255.255.255.255 192.168.10.1
```

**IMPORTANT**

An error may occur if:

- The IP address, address mask or the next-hop IP address are invalid.
- A route with the parameters that you have specified already exists.
- The IP address that you have specified is being used for another interface.
- The IP address and address mask are inconsistent. (If the address mask byte is 0, the IP address byte should also be 0. For example, if the address mask is 255.255.255.0, the IP address should be 11.2.3.0.)
- The next-hop IP address that you have specified is either unreachable or is down.

| | |
|---|---|
| **Command Syntax** | `npu(config)# ip route <ip_address> <ip_mask> <ip_nexthop>` |

**Privilege Level** `10`

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<ip_address>` | Indicates the destination host or network IP address, for which the route is to be added. If the mask byte is 0, ensure that the address byte is also 0. | Mandatory | N/A | Valid IP address |
| `<ip_mask>` | Indicates the address mask for the static route to be added. | Mandatory | N/A | Valid address mask |
| `<ip_nexthop>` | Indicates the next hop IP address, for the route to be added. | Mandatory | N/A | Valid IP address |

**Command Modes** Global configuration mode

### 4.3.8.2 Deleting a Static Route

To delete a static route, run the following command:

**`npu(config)# no ip route`** `<ip_address> <ip_mask> <ip_nexthop>`

For example, run the following command to delete an entry for a static route with the destination IP address, 11.0.0.2, and the address mask, 255.255.255.255, and next-hop IP address, 192.168.10.1.

**`npu(config)# no ip route 11.0.0.2 255.255.255.255 192.168.10.1`**

**IMPORTANT**

An error may occur if a route matching the specified parameters does not exist.

**Command Syntax** **`npu(config)# no ip route`** `<ip_address> <ip_mask> <ip_nexthop>`

**Privilege Level** `10`

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ip_address> | Indicates the destination host or network IP address, for which the route is to be deleted. | Mandatory | N/A | Valid IP address |
| <ip_mask> | Indicates the address mask for the static route to be deleted. | Mandatory | N/A | Valid address mask |
| <ip_nexthop> | Indicates the next hop IP address, for the route to be deleted. | Mandatory | N/A | Valid IP address |

**Command Modes** Global configuration mode

### 4.3.8.3 Displaying the IP Routing Table

To display the IP routing table, run the following command:

```
npu# show ip route
```

**Command Syntax** `npu(config)# show ip route`

**Privilege Level** `1`

**Display Format**

```
<IP address/mask>          is directly connected
<IP address/mask>          is directly connected
<IP address/mask>          is directly connected
<IP address/mask>          via <Next-hop IP address>
<IP address/mask>          via <Next-hop IP address>
                           via <Next-hop IP address>
<IP address/mask>          via <Next-hop IP address>
<IP address/mask>          via <Next-hop IP address>
```

**Command Modes**

Global command mode

## 4.3.9 Configuring ACLs

ACLs are applied on traffic received from the DATA, MGMT or CSCD ports, and destined towards the following virtual interfaces:

- AUs
- NPU

By default, all traffic destined towards the AUs or NPU is denied. You can use the CLI to configure ACLs for permitting and filtering traffic destined towards the NPU or AUs.

You can create the following types of ACLs:

- Standard: Allows you to filter traffic based on the source or destination IP address.
- Extended: Allows you to filter traffic based on the source or destination IP address, protocol or port.

**IMPORTANT**

You can use extended ACLs to also configure QoS classification rules for classifying traffic originating from the NPU into different flows. For details, refer "Configuring QoS Marking Rules" on page 190).

You can create the following types of rules for an ACL:

- Permit: Indicates that traffic matching the filter criteria is allowed to reach the NPU or AUs.

- Deny: Indicates that traffic matching the filter criteria is dropped, and not allowed to reach the NPU or AUs.

You can configure multiple rules for each ACL; the priority for these rules is applied with respect to the sequence in which these rules are configured. After you configure an ACL, you can attach the ACL with either the NPU or the AUs.

**IMPORTANT**

You cannot create Permit or Deny rules for an ACL that is associated with a Qos marking rule. You can either associate QoS marking rules or permit/deny rules with an ACL.

All ACLs are either in the ACTIVE or INACTIVE state. The ACTIVE state indicates that the ACL is attached to one or more interfaces; the INACTIVE state indicates that the ACL is not attached to any interface.

**IMPORTANT**

By default, all ACLs are INACTIVE, and are ACTIVE only after you attach the ACL to an interface to make ACTIVE.That is, all traffic destined to the NPU or AUs is denied until you configure ACLs for permitting specific connections.

This section describes the commands for:

- “Configuring an ACL in the Standard/Extended Mode” on page 210

- “Deleting an ACL” on page 234

- “Attaching/De-attaching ACLs to/from an Interface” on page 235

- “Displaying ACL Configuration Information” on page 238

### 4.3.9.1 Configuring an ACL in the Standard/Extended Mode

You can configure an ACL in either of the following modes:

- Standard mode: Use this mode if you want to create Permit or Deny rules for traffic from/to:

  - Source IP address

- Destination IP address

- Extended mode: Use this mode if you want to create Permit or Deny rules with respect to the:
  - Type of traffic transmitted by a particular host
  - Source and destination port numbers
  - Protocol with the source and destination IP address

**To configure an ACL:**

1. Enable the standard or extended ACL configuration mode (refer Section 4.3.9.1.1).
2. After you enter the ACL configuration mode, you can:
   - Configure ACLs in the standard mode (refer Section 4.3.9.1.2).
   - Configure ACLs in the extended mode (refer Section 4.3.9.1.3).
3. Terminate the ACL configuration mode (refer Section 4.3.9.1.4).
4. After you have configured the ACL, you can attach the ACL with the AUs or NPU refer Section 4.3.9.3.

### 4.3.9.1.1 Enable the ACL Configuration Mode/Creating an ACL

To configure an ACL, first enable either of the following ACL configuration modes:

- Standard
- Extended

**IMPORTANT**

ACL 199 is the default extended ACL that is pre-configured in the system, and is not attached to any interface, that is, it is INACTIVE. However, ACL 199 is reserved for QoS marking rules. You cannot configure Permit/Deny rules for ACL 199.

To view the default configuration information for ACL 199, you can run the following command:

```
npu# show access-lists 199
```

For more information about this command, refer Section 4.3.9.4.

To apply this ACL to traffic destined towards the AUs or the NPU, you are required to activate this ACL. (for details refer Section 4.3.9.3).

Run the following command to enable the ACL configuration mode. You can also use this command to create a new ACL.

```
npu(config)# ip access-list { standard <access-list-number (1-99)>
| extended <access-list-number (100-199)> }[name<string>]
```

When you run this command, the ACL configuration mode for the newly-created ACL is automatically enabled.

For example, run the following command to create ACL 22 in the standard mode:

```
npu(config)# ip access-list standard 22
```

For example, run the following command to create ACL 111 in the extended mode:

```
npu(config)# ip access-list extended 111
```

After you create an ACL or enable the ACL configuration mode, you can

- Configure the ACL in the standard mode (refer Section 4.3.9.1.2)
- Configuring the ACL in the extended mode (refer Section 4.3.9.1.3)

**IMPORTANT**

An error may occur if:·

- You specify an invalid ACL number. The ACL number should be between 1 and 99 in the standard mode, and between 100 and 199 in the extended mode.
- The ACL name you have specified is already used for another ACL or is more than 20 characters.

| | |
|---|---|
| **Command Syntax** | `npu(config)# ip access-list { standard <access-list-number (1-99)> \| extended <access-list-number (100-199)> }[name<string>]` |
| **Privilege Level** | `10` |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `standard <access-list-number (1-99)> \| extended <access-list-number (100-199)>` | Denotes the number of the standard or extended ACL that is to be created or for which the ACL configuration mode is to be enabled. If you are creating a new ACL, the ACL configuration mode is automatically enabled when you execute this command.<br>**Note**: ACL 199 is reserved for QoS marking rules and cannot be used for creating Permit/Deny rules. | Mandatory | N/A | ■ standard 1-99<br>■ extended (100-198) |
| `[name<string>]` | Indicates the name of the ACL to be created or for which the ACL configuration mode is to be enabled. | Optional | ACL name | String (upto 20 characters) |

**Command Modes**

Global configuration mode

### 4.3.9.1.2 Configuring ACLs in the Standard Mode

After you have enabled the standard ACL configuration mode, you can create or delete the Permit/Deny rules for forwarding traffic from/to a particular source/destination IP address.

**IMPORTANT**

You cannot create Permit or Deny rules for an ACL that is associated with a Qos marking rule. You can either associate QoS marking rules or permit/deny rules with an ACL.

This section describes the commands for:

- “Creating a Permit/Deny Rule (Standard Mode)” on page 214
- “Deleting a Permit/Deny Rule (Standard Mode)” on page 216

**IMPORTANT**

After you have configured the rules to be applied on an ACL, you can attach the ACL to the NPU or AUs. The ACL enables filtering of traffic destined to these interfaces. For more information, refer to Section 4.3.9.3.

#### 4.3.9.1.2.1 Creating a Permit/Deny Rule (Standard Mode)

Run the following commands to create the Permit/Deny rules for forwarding traffic from/to a particular source/destination IP address:

```
npu(config-std-nacl)# permit { any | host <src-ip-address> |
<network-src-ip> <mask> } [ { any | host <dest-ip-address> |
<network-dest-ip> <mask> } ]
```

```
npu(config-std-nacl)# deny { any | host <src-ip-address> |
<network-src-ip> <mask> } [ { any | host <dest-ip-address> |
<network-dest-ip> <mask> } ]
```

**IMPORTANT**

In the above commands, it is mandatory to specify the source IP address for which the Permit/Deny rule is to be created. If you do not specify the destination IP address/subnet mask, by default, traffic to all destination IP addresses configured for the NPU is permitted/denied.

The following table lists the parameters and their descriptions in these commands.

**Table 4-16: Parameters for Configuring Permit/Deny Rules in the Standard ACL Mode**

| | Parameter | Description | Example |
|---|---|---|---|
| Source IP | `any` | Indicates that incoming traffic from any source IP address is permitted or denied. | **`npu(config-std-nacl)# permit any`**<br>**`npu(config-std-nacl)# deny any`** |
| | `host <src-ip-address>` | Indicates that incoming traffic from a specific source IP address is permitted or denied. | **`npu(config-std-nacl)# permit host 1.1.1.1`**<br>**`npu(config-std-nacl)# deny host 1.1.1.1`** |
| | `<network-src-ip> <mask>` | Indicates that incoming traffic is to be permitted or denied for a particular subnet. | **`npu(config-std-nacl)# permit 1.1.1.0 255.255.255.0`**<br>**`npu(config-std-nacl)# deny 1.1.1.0 255.255.255.0`** |

**Table 4-16: Parameters for Configuring Permit/Deny Rules in the Standard ACL Mode**

| | | | |
|---|---|---|---|
| Destination IP address | any | Indicates that traffic destined to all NPU IP addresses is permitted or denied. | **npu(config-std-nacl)# permit host 1.1.1.1 any**<br>**npu(config-std-nacl)# deny host 1.1.1.1 any** |
| | host <src-ip-address> | Indicates that traffic destined to a specific destination IP address is permitted or denied. | **npu(config-std-nacl)# permit any host 1.1.1.1**<br>**npu(config-std-nacl)# deny any host 1.1.1.1** |
| | <network-src-ip> <mask> | Indicates that traffic destined to a particular subnet is to be permitted or denied. | **npu(config-std-nacl)# permit any 1.1.1.0 255.255.255.0**<br>**npu(config-std-nacl)# deny any 1.1.1.0 255.255.255.0** |

**Command Syntax**

**npu(config-std-nacl)# permit** { **any** | **host** <src-ip-address> | <network-src-ip> <mask> } [ { **any** | **host** <dest-ip-address> | <network-dest-ip> <mask> } ]

**npu(config-std-nacl)# deny** { **any** | **host** <src-ip-address> | <network-src-ip> <mask> } [ { **any** | **host** <dest-ip-address> | <network-dest-ip> <mask> } ]

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| { any \| host <src-ip-address> \| <network-src-ip> <mask> } | Indicates the source IP address/subnet for which incoming traffic is permitted/denied. | Mandatory | N/A | For details, refer Table 4-16 |
| [ { any \| host <dest-ip-address> \| <network-dest-ip> <mask> } ] | Indicates the destination IP address/subnet for which traffic is permitted/denied | Optional | any | For details, refer Table 4-16 |

**Command Modes**

Standard ACL configuration mode

### 4.3.9.1.2.2 Deleting a Permit/Deny Rule (Standard Mode)

Run the following commands to delete the Permit/Deny rule for incoming traffic from/to a specific IP address/subnet.

```
npu(config-std-nacl)# no permit { any | host <src-ip-address> |
<network-src-ip> <mask> } [ { any | host <dest-ip-address> |
<network-dest-ip> <mask> } ]
```

```
npu(config-std-nacl)# no deny { any | host <src-ip-address> |
<network-src-ip> <mask> } [ { any | host <dest-ip-address> |
<network-dest-ip> <mask> } ]
```

**Command Syntax**

```
npu(config-std-nacl)# no permit { any | host <src-ip-address> |
<network-src-ip> <mask> }  [ { any | host <dest-ip-address> |
<network-dest-ip> <mask> } ]
```

```
npu(config-std-nacl)# no deny { any | host <src-ip-address> |
<network-src-ip> <mask> }  [ { any | host <dest-ip-address> |
<network-dest-ip> <mask> } ]
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| { any \| host <src-ip-address> \| <network-src-ip> <mask> } | Indicates the source IP address/subnet for which the Permit/Deny rule is to be deleted. | Mandatory | N/A | For details, refer Table 4-16 |
| [ { any \| host <dest-ip-address> \| <network-dest-ip> <mask> } ] | Indicates the destination IP address/subnet for which the Permit/Deny rule is to be deleted. | Optional | any | For details, refer Table 4-16 |

**Command Modes**

Standard ACL configuration mode

#### 4.3.9.1.3 Configuring ACLs in the Extended Mode

After you have enabled the extended ACL configuration mode, you can create Permit/Deny rules based on source/destination IP address, protocol and source/destination port numbers.

**IMPORTANT**

You cannot create Permit or Deny rules for an ACL that is associated with a Qos marking rule. You can either associate QoS marking rules or permit/deny rules with an ACL.

This section describes the commands to be used for:

- "Configuring Permit/Deny Rules from/to a Specific Protocol and Source/Destination IP Addresses" on page 217
- "Configuring Permit/Deny Rules for TCP/UDP Traffic" on page 222
- "Configuring Permit/Deny Rules for ICMP Traffic" on page 230

**IMPORTANT**

After you have configured the rules to be applied on an ACL, you can attach the ACL to the NPU or AUs. The ACL enables filtering of traffic destined to these interfaces. For more information, refer to Section 4.3.9.3.

##### 4.3.9.1.3.1 Configuring Permit/Deny Rules from/to a Specific Protocol and Source/Destination IP Addresses

After you have created an ACL, you can configure Permit/Deny rules to be applied for traffic from/to a particular source/destination IP address/subnet, with respect to a specific protocol.

**IMPORTANT**

You cannot configure Permit or Deny rules for an ACL that is associated with a Qos marking rule. You can either associate QoS marking rules or permit/deny rules with an ACL.

This section describes the commands to be used for:

- "Creating a Permit/Deny Rule for Specific Protocols/IP Addresses (Extended Mode)" on page 218
- "Deleting a Permit/Deny Rule for Specific Protocols/IP Addresses (Extended Mode)" on page 221

#### 4.3.9.1.3.1.1 Creating a Permit/Deny Rule for Specific Protocols/IP Addresses (Extended Mode)

You can create the Permit or Deny rule for traffic from/to a source/ destination IP address/subnet with respect to the following protocols:

- IP
- OSPF
- Protocol Independent Multicast (PIM)
- Any other protocol

Run the following commands to create the Permit/Deny rule for traffic from and to a specific IP address/subnet for a particular protocol:

```
npu(config-ext-nacl)# permit { ip | ospf | pim | <protocol-type
(1-255)>} { any | host <src-ip-address> | <src-ip-address> <mask> }
{ any | host <dest-ip-address> | <dest-ip-address> <mask> }
```

```
npu(config-ext-nacl)# deny { ip | ospf | pim | <protocol-type
(1-255)>} { any | host <src-ip-address> | <src-ip-address> <mask> }
{ any | host <dest-ip-address> | <dest-ip-address> <mask> }
```

In the above commands, it is mandatory to specify the protocol and source IP address for which the Permit/Deny rule is to be created. If you do not specify the destination IP address/subnet mask, by default, traffic to all destination IP addresses is permitted/denied.

The following table lists the parameters and their descriptions in these commands:

**Table 4-17: Parameters for Configuring Permit/Deny Rules for Traffic from/to Specific IP Addresses**

| | Parameter | Description | Example |
|---|---|---|---|

**Table 4-17: Parameters for Configuring Permit/Deny Rules for Traffic from/to Specific IP Addresses**

| | | | |
|---|---|---|---|
| Protocol | `ip` | Indicates that the Permit/Deny rule to be created is to be applied for the IP-in-IP packets. | **`npu(config-ext-nacl)# permit ip any`** |
| | `ospf` | Indicates that the Permit/Deny rule to be created is to be applied to OSPF packets. | **`npu(config-ext-nacl)# permit ospf any`** |
| | `pim` | Indicates that the Permit/Deny rule to be created is to be applied to the PIM packets. | **`npu(config-ext-nacl)# permit pim any`** |
| | `<protocol-type (1-255)>` | Indicates that the Permit/Deny rule to be created is to be applied to traffic from/to any protocol (other than IP, OSPF, PIM). Use standard IANA values to specify the values of these protocols | **`npu(config-ext-nacl)# permit 11 any`** |
| Source IP address | `any` | Indicates that incoming traffic from any source IP address is permitted or denied. | **`npu(config-std-nacl)# permit ip any`**<br>**`npu(config-std-nacl)# deny ip any`** |
| | `host <src-ip-address>` | Indicates that incoming traffic from a specific source IP address is permitted or denied. | **`npu(config-std-nacl)# permit ip host 1.1.1.1`**<br>**`npu(config-std-nacl)# deny ip host 1.1.1.1`** |
| | `<network-src-ip> <mask>` | Indicates that incoming traffic is to be permitted or denied for a particular source IP address and subnet mask. | **`npu(config-std-nacl)# permit ip 1.1.1.0 255.255.255.0`**<br>**`npu(config-std-nacl)# deny ip 1.1.1.0 255.255.255.0`** |

**Table 4-17: Parameters for Configuring Permit/Deny Rules for Traffic from/to Specific IP Addresses**

| | | | |
|---|---|---|---|
| Destination IP address | any | Indicates that traffic to any destination IP address is permitted or denied. any is the default destination IP address. | **npu(config-std-nacl)# permit ip host 1.1.1.1 any**<br>**npu(config-std-nacl)# deny ip host 1.1.1.1 any** |
| | host <dst-ip-address> | Indicates that traffic destined to a specific destination IP address is permitted or denied. | **npu(config-std-nacl)# permit ip any host 1.1.1.1**<br>**npu(config-std-nacl)# deny ip any host 1.1.1.1** |
| | <network-dst-ip> <mask> | Indicates that traffic destined to a particular subnet is to be permitted or denied. | **npu(config-std-nacl)# permit ip any 1.1.1.0 255.255.255.0**<br>**npu(config-std-nacl)# deny ip any 1.1.1.0 255.255.255.0** |

**Command Syntax**

**npu(config-ext-nacl)# permit** { **ip** | **ospf** | **pim** | <protocol-type (1-255)>} { **any** | **host** <src-ip-address> | <src-ip-address> <mask> } { **any** | **host** <dest-ip-addresq> | <dest-ip-address> <mask> }

**npu**(config-ext-nacl)# **deny** { **ip** | **ospf** | **pim** | <protocol-type (1-255)>} { **any** | host <src-ip-address> | <src-ip-address> <mask> } { **any** | **host** <dest-ip-addresq> | <dest-ip-address> <mask> }

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| { ip \| ospf \| pim \| <protocol-type (1-255)>} | Indicates the type of protocol for which incoming traffic is permitted. | Mandatory | N/A | For details, refer Table 4-17 |
| { any \| host <src-ip-address> \| <src-ip-address> <mask> } | Indicates the source IP address/subnet for which incoming traffic is permitted/denied. | Mandatory | N/A | For details, refer Table 4-17 |

| | | | | | |
|---|---|---|---|---|---|
| | { any \| host <dest-ip-addresq> \| <dest-ip-address> <mask> } | Indicates the destination IP address/subnet for which traffic is permitted/denied | Optional | any | For details, refer Table 4-17 |

**Command Modes** Extended ACL configuration mode

### 4.3.9.1.3.1.2 Deleting a Permit/Deny Rule for Specific Protocols/IP Addresses (Extended Mode)

Run the following commands to delete the Permit/Deny rule for traffic from to a specific IP address/subnet for a particular protocol:

```
npu(config-ext-nacl)# no permit { ip | ospf | pim | <protocol-type (1-255)>} { any | host <src-ip-address> | <src-ip-address> <mask> } { any | host <dest-ip-address> | <dest-ip-address> <mask> }
```

```
npu(config-ext-nacl)# no deny { ip | ospf | pim | <protocol-type (1-255)>} { any | host <src-ip-address> | <src-ip-address> <mask> } { any | host <dest-ip-address> | <dest-ip-address> <mask> }
```

**Command Syntax**

```
npu(config-ext-nacl)# no permit { ip | ospf | pim | <protocol-type (1-255)>} { any | host <src-ip-address> | <src-ip-address> <mask> } { any | host <dest-ip-addresq> | <dest-ip-address> <mask> }
```

```
npu(config-ext-nacl)# no deny { ip | ospf | pim | <protocol-type (1-255)>} { any | host <src-ip-address> | <src-ip-address> <mask> } { any | host <dest-ip-addresq> | <dest-ip-address> <mask> }
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| { ip \| ospf \| pim \| <protocol-type (1-255)>} | Indicates the type of protocol for which the Permit/Deny rule is to be deleted. | Mandatory | N/A | For details, refer Table 4-17 |

| | | | | | |
|---|---|---|---|---|---|
| | `{ any \| host <src-ip-address> \| <src-ip-address> <mask> }` | Indicates the source IP address/subnet for which the Permit/Deny rule is to be deleted. | Mandatory | N/A | For details, refer Table 4-17 |
| | `{ any \| host <dest-ip-address> \| <dest-ip-address> <mask> }` | Indicates the destination IP address/subnet for which the Permit/Deny rule is to be deleted. | Optional | any | For details, refer Table 4-17 |

**Command Modes** Extended ACL configuration mode

### 4.3.9.1.3.2 Configuring Permit/Deny Rules for TCP/UDP Traffic

After you have created an ACL, you can configure Permit/Deny rules for TCP and UDP traffic from/to specific source and destination IP address and port.

**IMPORTANT**

You cannot configure Permit or Deny rules for an ACL that is associated with a Qos marking rule. You can either associate QoS marking rules or permit/deny rules with an ACL.

This section describes the commands to be used for:

- "Creating a Permit/Deny Rule for TCP/UDP Traffic (Extended Mode)" on page 222
- "Deleting a Permit/Deny Rule for TCP/UDP Traffic (Extended Mode)" on page 227

#### *4.3.9.1.3.2.1 Creating a Permit/Deny Rule for TCP/UDP Traffic (Extended Mode)*

Run the following commands to specify the Permit rule for TCP/UDP traffic from/to a specific source/destination IP address/port:

```
npu(config-ext-nacl)# permit tcp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)> | lt
<port-number (1-65535)> |eq <port-number (1-65535)> | range
<port-number (1-65535)> <port-number (1-65535)>}] {any | host
<dest-ip-address> | <dest-ip-address> <dest-mask>} {gt <port-number
(1-65535)>   | lt <port-number (1-65535)> | eq <port-number
(1-65535)> | range <port-number (1-65535)> <port-number
(1-65535)>}]
```

```
npu(config-ext-nacl)# permit udp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)> | lt
<port-number (1-65535)> |eq <port-number (1-65535)> | range
<port-number (1-65535)> <port-number (1-65535)>}] {any | host
<dest-ip-address> | <dest-ip-address> <dest-mask>} {gt <port-number
(1-65535)>   | lt <port-number (1-65535)> | eq <port-number
(1-65535)> | range <port-number (1-65535)> <port-number
(1-65535)>}]
```

Run the following commands to specify the Deny rule for TCP/UDP traffic from/to a specific source/destination IP address/port:

```
npu(config-ext-nacl)# deny tcp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)> | lt
<port-number (1-65535)> |eq <port-number (1-65535)> | range
<port-number (1-65535)> <port-number (1-65535)>}] {any | host
<dest-ip-address> | <dest-ip-address> <dest-mask>} {gt <port-number
(1-65535)>   | lt <port-number (1-65535)> | eq <port-number
(1-65535)> | range <port-number (1-65535)> <port-number
(1-65535)>}]
```

```
npu(config-ext-nacl)# deny udp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)> | lt
<port-number (1-65535)> |eq <port-number (1-65535)> | range
<port-number (1-65535)> <port-number (1-65535)>}] {any | host
<dest-ip-address> | <dest-ip-address> <dest-mask>} {gt <port-number
(1-65535)>   | lt <port-number (1-65535)> | eq <port-number
(1-65535)> | range <port-number (1-65535)> <port-number
(1-65535)>}]
```

In the above commands, it is mandatory to specify the source and destination IP address for which the Permit/Deny rule is to be created.

**IMPORTANT**

To increase the granularity of the Permit/Deny rule you are creating, specify the source and destination port numbers for the source and destination IP addresses.

The following table lists the parameters and their descriptions in these commands:

**Table 4-18: Parameters for Configuring Permit/Deny Rules for TCP/UDP Traffic**

| | Parameter | Description | Example |
|---|---|---|---|

**Table 4-18: Parameters for Configuring Permit/Deny Rules for TCP/UDP Traffic**

| | | | |
|---|---|---|---|
| Source IP address | `any` | Indicates that incoming TCP/UDP traffic from any source IP address is permitted or denied. | **`npu(config-ext-nacl)# permit tcp any any`**<br>**`npu(config-ext-nacl)# deny udp any`** |
| | `host <src-ip-address>` | Indicates that incoming TCP/UDP traffic from a specific source IP address is permitted or denied. | **`npu(config-ext-nacl)# permit tcp host 1.1.1.1 any`**<br>**`npu(config-ext-nacl)# deny udp host 1.1.1.1`** |
| | `<network-src-ip> <mask>` | Indicates that incoming TCP/UDP traffic is to be permitted or denied for a particular subnet. | **`npu(config-ext-nacl)# permit tcp 1.1.1.0 255.255.255.0 any`**<br>**`npu(config-ext-nacl)# deny udp 1.1.1.0 255.255.255.0`** |
| Source port | `[{gt <port-number (1-65535)>` | Indicates that incoming TCP/UDP traffic is to be permitted or denied from the source port for which the port number is greater than the value of this parameter. | **`npu(config-ext-nacl)# permit tcp 1.1.1.0 255.255.255.0 gt 1111`**<br>**`npu(config-ext-nacl)# deny udp host 1.1.1.1 gt 1010`** |
| | `[{lt <port-number (1-65535)>` | Indicates that incoming TCP/UDP traffic is to be permitted or denied from the source port for which the port number is less than the value of this parameter. | **`npu(config-ext-nacl)# permit tcp 1.1.1.0 255.255.255.0 lt 1111`**<br>**`npu(config-ext-nacl)# deny udp host 1.1.1.1 lt 1010`** |
| | `[{eq <port-number (1-65535)>` | Indicates that incoming TCP/UDP traffic is to be permitted or denied from the source port for which the port number is equal to the value of this parameter. | **`npu(config-ext-nacl)# permit tcp 1.1.1.0 255.255.255.0 eq 8080`**<br>**`npu(config-ext-nacl)# deny udp host 1.1.1.1 eq 4040`** |
| | `range <port-number (1-65535)> <port-number (1-65535)> }]` | Indicates that incoming TCP/UDP traffic is to be permitted or denied from the source port for which the port number is within the range specified by this parameter. | **`npu(config-ext-nacl)# permit tcp 1.1.1.0 255.255.255.0 range 1010 8080`**<br>**`npu(config-ext-nacl)# deny udp host 1.1.1.1 range 1010 4040`** |

**Table 4-18: Parameters for Configuring Permit/Deny Rules for TCP/UDP Traffic**

| | | | |
|---|---|---|---|
| Destination IP address | any | Indicates that TCP/UDP traffic to all NPU interface IP addresses is permitted or denied. | **npu(config-ext-nacl)# permit tcp 1.1.1.1 host any**<br>**npu(config-ext-nacl)# deny udp any any** |
| | host <src-ip-address> | Indicates that TCP/UDP traffic to a specific NPU interface IP address is permitted or denied. | **npu(config-ext-nacl)# permit tcp any host 1.1.1.1 host host 1.1.1.1**<br>**npu(config-ext-nacl)# deny udp any host 1.1.1.1** |
| | <network-src-ip> <mask> | Indicates that TCP/UDP traffic is to be permitted or denied for a particular NPU interface subnet. | **npu(config-ext-nacl)# permit tcp any host 1.1.1.0 255.255.255.0**<br>**npu(config-ext-nacl)# deny udp any host 1.1.1.0 255.255.255.0** |
| Destination port | [{gt <port-number (1-65535)> | Indicates that TCP/ UDPtraffic is to be permitted or denied to the NPU interface source port for which the port number is greater than the value of this parameter. | **npu(config-ext-nacl)# permit tcp host 1.1.1.1 host any gt 8080**<br>**npu(config-ext-nacl)# deny udp any any** |
| | [{lt <port-number (1-65535)> | Indicates that TCP/ UDP traffic is to be permitted or denied to the NPU interface source port for which the port number is less than the value of this parameter. | **npu(config-ext-nacl)# permit tcp host 1.1.1.0 255.255.255.0 any lt 1111**<br>**npu(config-ext-nacl)# deny udp any host 1.1.1.1 lt 1010** |
| | [{eq <port-number (1-65535)> | Indicates that TCP/ UDP traffic is to be permitted or denied to the NPU interfacesource port for which the port number is equal to the value of this parameter. | **npu(config-ext-nacl)# permit tcp any 1.1.1.0 255.255.255.0 eq 8080**<br>**npu(config-ext-nacl)# deny udp any host 1.1.1.1 eq 4040** |
| | range <port-number (1-65535)> <port-number (1-65535)> }] | Indicates that TCP/ UDP traffic is to be permitted or denied the NPU interface source port for which the port number is within the range specified by this parameter. | **npu(config-ext-nacl)# permit tcp host 1.1.1.1 host 1.1.1.0 255.255.255.0 range 1010 8080**<br>**npu(config-ext-nacl)# deny udp host 1.1.1.1 any range 1010 4040** |

**Command Syntax**

```
npu(config-ext-nacl)# deny tcp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)>  | lt
<port-number (1-65535)> |eq <port-number (1-65535)>  | range <port-number
(1-65535)> <port-number (1-65535)>}] {any | host <dest-ip-address> |
<dest-ip-address> <dest-mask>} {gt <port-number (1-65535)>   | lt
<port-number (1-65535)> | eq <port-number (1-65535)>  | range
<port-number (1-65535)> <port-number (1-65535)>}]
```

```
npu(config-ext-nacl)# deny udp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)>  | lt
<port-number (1-65535)> |eq <port-number (1-65535)>  | range <port-number
(1-65535)> <port-number (1-65535)>}] {any | host <dest-ip-address> |
<dest-ip-address> <dest-mask>} {gt <port-number (1-65535)>   | lt
<port-number (1-65535)> | eq <port-number (1-65535)>  | range
<port-number (1-65535)> <port-number (1-65535)>}]
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| any \| host <src-ip-address> \| <src-ip-address> <src-mask> | Indicates the source host for which incoming TCP/UDP traffic is permitted/denied. | Mandatory | N/A | For details, refer Table 4-18 |
| [{gt <port-number (1-65535)> \| lt <port-number (1-65535)> \|eq <port-number (1-65535)> \| range <port-number (1-65535)> <port-number (1-65535)>}] | Indicates the source port from which incoming TCP/UDP traffic is permitted/denied. | Optional | 0-65535 | For details, refer Table 4-18 |

| | | | | | |
|---|---|---|---|---|---|
| | any \| host <dest-ip-address> \| <dest-ip-address> <dest-mask> | Indicates the destination IP address/subnet for which TCP/UDP traffic is permitted/denied. | Mandatory | N/A | For details, refer Table 4-18 |
| | {gt <port-number (1-65535)> \| lt <port-number (1-65535)> \| eq <port-number (1-65535)> \| range <port-number (1-65535)> <port-number (1-65535)>}] | Indicates the destination port to which TCP/UDP traffic is permitted/denied. | Optional | 0-65535 | For details, refer Table 4-18 |

**Command Modes** Extended ACL configuration mode

### 4.3.9.1.3.2.2 Deleting a Permit/Deny Rule for TCP/UDP Traffic (Extended Mode)

Run the following commands to delete a Permit rule for TCP/UDP traffic from/to a specific IP address/port:

```
npu(config-ext-nacl)# no permit tcp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)> | lt
<port-number (1-65535)> |eq <port-number (1-65535)> | range
<port-number (1-65535)> <port-number (1-65535)>}] {any | host
<dest-ip-address> | <dest-ip-address> <dest-mask>} {gt <port-number
(1-65535)>   | lt <port-number (1-65535)> | eq <port-number
(1-65535)> | range <port-number (1-65535)> <port-number
(1-65535)>}]
```

```
npu(config-ext-nacl)# no permit udp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)> | lt
<port-number (1-65535)> |eq <port-number (1-65535)> | range
<port-number (1-65535)> <port-number (1-65535)>}] {any | host
<dest-ip-address> | <dest-ip-address> <dest-mask>} {gt <port-number
(1-65535)>   | lt <port-number (1-65535)> | eq <port-number
```

```
(1-65535)> | range <port-number (1-65535)> <port-number
(1-65535)>}]
```

Run the following commands to delete a Deny rule for TCP/UDP traffic from/to a specific IP address/port:

```
npu(config-ext-nacl)# no deny tcp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)> | lt
<port-number (1-65535)> |eq <port-number (1-65535)> | range
<port-number (1-65535)> <port-number (1-65535)>}] {any | host
<dest-ip-address> | <dest-ip-address> <dest-mask>} {gt <port-number
(1-65535)>   | lt <port-number (1-65535)> | eq <port-number
(1-65535)> | range <port-number (1-65535)> <port-number
(1-65535)>}]
```

```
npu(config-ext-nacl)# no deny udp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)> | lt
<port-number (1-65535)> |eq <port-number (1-65535)> | range
<port-number (1-65535)> <port-number (1-65535)>}] {any | host
<dest-ip-address> | <dest-ip-address> <dest-mask>} {gt <port-number
(1-65535)>   | lt <port-number (1-65535)> | eq <port-number
(1-65535)> | range <port-number (1-65535)> <port-number
(1-65535)>}]
```

**Command Syntax (for Permit Rule)**

```
npu(config-ext-nacl)# no permit tcp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)>  | lt
<port-number (1-65535)> |eq <port-number (1-65535)>  | range <port-number
(1-65535)> <port-number (1-65535)>}] {any | host <dest-ip-address> |
<dest-ip-address> <dest-mask>} {gt <port-number (1-65535)>   | lt
<port-number (1-65535)> | eq <port-number (1-65535)>  | range
<port-number (1-65535)> <port-number (1-65535)>}]
```

```
npu(config-ext-nacl)# no permit udp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)>  | lt
<port-number (1-65535)> |eq <port-number (1-65535)>  | range <port-number
(1-65535)> <port-number (1-65535)>}] {any | host <dest-ip-address> |
<dest-ip-address> <dest-mask>} {gt <port-number (1-65535)>   | lt
<port-number (1-65535)> | eq <port-number (1-65535)>  | range
<port-number (1-65535)> <port-number (1-65535)>}]
```

**Command Syntax (for Deny Rule)**

```
npu(config-ext-nacl)# no deny tcp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)>  | lt
<port-number (1-65535)> |eq <port-number (1-65535)>  | range <port-number
(1-65535)> <port-number (1-65535)>}] {any | host <dest-ip-address> |
<dest-ip-address> <dest-mask>} {gt <port-number (1-65535)>   | lt
<port-number (1-65535)> | eq <port-number (1-65535)>  | range
<port-number (1-65535)> <deny-number (1-65535)>}]
```

```
npu(config-ext-nacl)# no deny udp {any | host <src-ip-address> |
<src-ip-address> <src-mask> } [{gt <port-number (1-65535)>  | lt
<port-number (1-65535)> |eq <port-number (1-65535)>  | range <port-number
(1-65535)> <port-number (1-65535)>}] {any | host <dest-ip-address> |
<dest-ip-address> <dest-mask>} {gt <port-number (1-65535)>   | lt
<port-number (1-65535)> | eq <port-number (1-65535)>  | range
<port-number (1-65535)> <port-number (1-65535)>}]
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| any \| host <src-ip-address> \| <src-ip-address> <src-mask> | Indicates the source host for which the Permit/Deny rule for incoming TCP/UDP traffic is to be deleted. | Mandatory | N/A | For details, refer Table 4-18 |
| [{gt <port-number (1-65535)> \| lt <port-number (1-65535)> \|eq <port-number (1-65535)> \| range <port-number (1-65535)> <port-number (1-65535)>}] | Indicates the source port for which the Permit/Deny rule for incoming TCP/UDP traffic is to be deleted. | Optional | 1-65535 | For details, refer Table 4-18 |

| | | | | | |
|---|---|---|---|---|---|
| | `any \| host <dest-ip-address> \| <dest-ip-address> <dest-mask>` | Indicates the NPU IP address/subnet for which the Permit/Deny rule for TCP/UDP traffic is to be deleted. | Mandatory | N/A | For details, refer Table 4-18 |
| | `[{gt <port-number (1-65535)> \| lt <port-number (1-65535)> \|eq <port-number (1-65535)> \| range <port-number (1-65535)> <port-number (1-65535)>}]` | Indicates the NPU interface port for which the Permit/Deny rule for incoming TCP/UDP traffic is to be deleted. | Optional | 1-65535 | For details, refer Table 4-18 |

| | |
|---|---|
| **Command Modes** | Extended ACL configuration mode |

### 4.3.9.1.3.3 Configuring Permit/Deny Rules for ICMP Traffic

After you have created an ACL, you can configure Permit/Deny rules for ICMP traffic from/to specific a source and destination IP address/subnet.

**IMPORTANT**

You cannot configure Permit or Deny rules for an ACL that is associated with a Qos marking rule. You can either associate QoS marking rules or permit/deny rules with an ACL.

This section describes the commands to be used for:

- “Creating a Permit/Deny Rule for ICMP Traffic (Extended Mode)” on page 230
- “Deleting a Permit/Deny Rule for ICMP Traffic (Extended Mode)” on page 233

#### *4.3.9.1.3.3.1 Creating a Permit/Deny Rule for ICMP Traffic (Extended Mode)*

Run the following commands to specify the Permit/Deny rule for ICMP traffic from/to a specific source/destination IP address/subnet:

```
npu(config-ext-nacl)# permit icmp { any | host <src-ip-address> |
<src-ip-address> <mask> } { any | host <dest-ip-address> |
<dest-ip-address> <mask> }
```

```
npu(config-ext-nacl)# deny icmp { any | host <src-ip-address> |
<src-ip-address> <mask> } { any | host <dest-ip-address> |
<dest-ip-address> <mask> }
```

In the above commands, it is mandatory to specify the source IP address for which the Permit/Deny rule is to be created. If you do not specify the destination IP address/subnet mask, by default, traffic to all destination IP addresses is permitted/denied.

The following table lists the parameters and their descriptions in these commands:

**Table 4-19: Parameters for Configuring Permit/Deny Rules for ICMP Traffic**

| | Parameter | Description | Example |
|---|---|---|---|
| Source IP | any | Indicates that incoming ICMP traffic from any source IP address is permitted or denied. | **npu(config-ext-nacl)#permit icmp any**<br>**npu(config-ext-nacl)#deny icmp any** |
| | host <src-ip-address> | Indicates that incoming ICMP traffic from a specific source IP address is permitted or denied. | **npu(config-ext-nacl)#permit icmp host 1.1.1.1**<br>**npu(config-ext-nacl)#deny icmp host 1.1.1.1** |
| | <network-src-ip> <mask> | Indicates that incoming ICMP traffic is to be permitted or denied for a particular subnet. | **npu(config-ext-nacl)#permit icmp 1.1.1.0 255.255.255.0**<br>**npu(config-ext-nacl)#deny icmp host 1.1.1.0 255.255.255.0** |

**Table 4-19: Parameters for Configuring Permit/Deny Rules for ICMP Traffic**

| | | | |
|---|---|---|---|
| Destination IP address | any | Indicates that ICMP traffic destined to the NPU interface IP address is permitted or denied. | **npu(config-ext-nacl)#permit icmp host 1.1.1.1 any**<br>**npu(config-std-nacl)# deny host 1.1.1.1 host any** |
| | host <src-ip-address> | Indicates that ICMP traffic destined to the NPU interface destination IP address is permitted or denied. | **npu(config-std-nacl)# permit host any host 1.1.1.1**<br>**npu(config-ext-nacl)#deny icmp any host 1.1.1.1** |
| | <network-src-ip> <mask> | Indicates that ICMP traffic to the NPU interface subnet is to be permitted or denied. | **npu(config-ext-nacl)#permit icmp host any host 1.1.1.0 255.255.255.0**<br>**npu(config-ext-nacl)#deny icmp host any host 1.1.1.0 255.255.255.0** |

**Command Syntax**

**npu(config-ext-nacl)# permit icmp** { **any** | **host** <src-ip-address> | <src-ip-address> <mask> } { **any** | **host** <dest-ip-address> | <dest-ip-address> <mask> }

**npu(config-ext-nacl)# deny icmp** { **any** | **host** <src-ip-address> | <src-ip-address> <mask> } { **any** | **host** <dest-ip-address> | <dest-ip-address> <mask> }

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| { **any** \| **host** <src-ip-address> \| <src-ip-address> <mask> } | Indicates the source IP address/subnet for which incoming ICMP traffic is permitted/denied. | Mandatory | N/A | For details Table 4-19 |
| { **any** \| **host** <dest-ip-address> \| <dest-ip-address> <mask> } | Indicates the destination IP address/subnet for which ICMP traffic is permitted/denied. | Optional | any | For details Table 4-19 |

**Command Modes** Global command mode

### 4.3.9.1.3.3.2 Deleting a Permit/Deny Rule for ICMP Traffic (Extended Mode)

Run the following commands to delete a Permit/Deny rule for ICMP traffic from/to a specific IP address/subnet:

```
npu(config-ext-nacl)# no permit icmp { any | host <src-ip-address>
| <src-ip-address> <mask> } { any | host <dest-ip-address> |
<dest-ip-address> <mask> }
```

```
npu(config-ext-nacl)# no deny icmp { any | host <src-ip-address> |
<src-ip-address> <mask> } { any | host <dest-ip-address> |
<dest-ip-address> <mask> }
```

**Command Syntax**

```
npu(config-ext-nacl)# no permit icmp { any | host <src-ip-address> |
<src-ip-address> <mask> }  { any | host <dest-ip-address> |
<dest-ip-address> <mask> }
```

```
npu(config-ext-nacl)# no deny icmp { any | host <src-ip-address> |
<src-ip-address> <mask> }  { any | host <dest-ip-address> |
<dest-ip-address> <mask> }
```

**Privilege Level** **10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{ any \| host <src-ip-address> \| <src-ip-address> <mask> }` | Indicates the source IP address/subnet for which the Permit/Deny rule for incoming ICMP traffic is to be deleted. | Mandatory | N/A | For details Table 4-19 |
| `{ any \| host <dest-ip-address> \| <dest-ip-address> <mask> }` | Indicates the destination IP address/subnet for which the Permit/Deny rule for ICMP traffic is to be deleted. | Optional | any | For details Table 4-19 |

**Command Modes** Extended ACL configuration mode

#### 4.3.9.1.4 Terminating the ACL Configuration Mode

To terminate the standard ACL configuration mode and return to the global configuration mode, run the following command:

```
npu(config-std-nacl)# exit
```

To exit the extended ACL configuration mode and return to the global configuration mode, run the following command:

```
npu(config-ext-nacl)# exit
```

| | |
|---|---|
| **Command Syntax** | **npu(config-std-nacl)# exit**<br>**npu(config-ext-nacl) # exit** |
| **Privilege Level** | 10 |
| **Command Modes** | Standard/Extended ACL configuration mode |

### 4.3.9.2 Deleting an ACL

**To delete an ACL:**

1. Check if the ACL is attached to the interface. For more information about this command, refer Section 4.3.9.4.
2. Enable the interface configuration mode and de-attach the ACL. For details, refer Section 4.3.9.3.
3. Terminate the interface configuration mode to return to the global configuration mode (refer Section 4.3.9.3.4).
4. Run the following command to delete the ACL:

```
npu(config)# no ip access-list { standard <access-list-number
(1-99)> | extended <access-list-number (100-199)> }
```

**IMPORTANT**

An error may occur if:

- The ACL you are trying to delete is INACTIVE.
- The ACL number you have specified does not exist.

**Command Syntax**

```
npu(config)# no ip access-list { standard <access-list-number (1-99)> |
extended <access-list-number (100-199)> }
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{ standard <access-list-number (1-99)> \| extended <access-list-number (100-199)> }` | Indicates the ACL number of the standard or extended ACL to be deleted. | Mandatory | N/A | ■ Standard (1-99)<br>■ Extended (100-199) |

**Command Modes**

Global configuration mode

### 4.3.9.3 Attaching/De-attaching ACLs to/from an Interface

You can attach or de-attach an ACL to either of the following virtual interfaces.

- NPU
- All the AU interfaces

When an ACL is attached to an interface, it is in the ACTIVE state; it is in the INACTIVE state when it is de-attached from an interface.

**To attach/de-attach an ACL:**

1. Enable the interface configuration mode (refer Section 4.3.9.3.1).
2. You can now execute either of the following tasks:
   - » Attach an ACL to an interface (refer Section 4.3.9.3.2).
   - » De-attach an ACL to an interface (refer Section 4.3.9.3.3).
3. Terminate the interface configuration mode (refer Section 4.3.9.3.4).

#### 4.3.9.3.1 Enabling the Interface Configuration Mode

ACLs are applied on traffic received from the DATA, MGMT or CSCD ports, and destined towards the following virtual interfaces:

- AUs
- NPU

By default, all traffic destined towards the AUs or the NPU is denied. Apply specific Permit ACLs to allow traffic to reach the AUs or the NPU. Run the following command to enable the interface configuration mode for the NPU:

```
npu(config)# interface npu-host
```

Run the following command to enable the interface configuration mode for all AUs:

```
npu(config)# interface all-au
```

After you have enabled the interface configuration mode, you can:

- Attach an ACL to an interface (Section 4.3.9.3.2)
- De-attach an ACL to an interface (Section 4.3.9.3.3)

#### 4.3.9.3.2 Attaching an ACL to an interface

After you have enabled the interface configuration mode, run the following command to attach an ACL with an interface:

```
npu(config-if)# ip access-group {<access-list-number (1-199)> |
<access-list-name>}
```

**IMPORTANT**

An error may occur if:

- The ACL number/name that you have specified does not exist or is already attached to this interface.
- You are trying to attach an ACL to an interface (other than the NPU/all AUs).

**Command Syntax**

```
npu(config-if)# ip access-group {<access-list-number (1-199)> |
<access-list-name>}
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {<access-list-number (1-199)> \| <access-list-name>} | Indicates the number or name of the ACL to be attached to this interface. | Mandatory | N/A | 1-99<br>String |

**Command Modes**

Interface configuration mode

### 4.3.9.3.3 Deattaching an ACL to an Interface

Run the following command to de-attach an ACL from an interface:

```
npu(config-if)# no ip access-group {<access-list-number (1-199)> |
<access-list-name>}
```

**IMPORTANT**

An error may occur if the ACL number/name that you have specified does not exist or is already attached to this interface.

**Command Syntax**

```
npu(config-if)# no ip access-group {<access-list-number (1-199)> |
<access-list-name>}
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {<access-list-number (1-199)> \| <access-list-name>} | Indicates the number/name of the ACL to be deattached from this interface. | Mandatory | N/A | ■ 1-99<br>■ String |

**Command Modes**

Interface configuration mode

#### 4.3.9.3.4 Terminating the Interface Configuration Mode

To exit the interface configuration mode and return to the global configuration mode, run the following command:

**npu(config-if)# exit**

**Command Syntax**

**npu(config-if)# exit**

**Privilege Level**

10

**Command Modes**

Interface configuration mode

### 4.3.9.4 Displaying ACL Configuration Information

Run the following command to display the configuration information for a specific ACL:

**npu# show access-lists** [{<access-list-number (1-199)> | <access-list-name} ]

**IMPORTANT**

An error may occur if the ACL number/name you have specified does not exist.

**Command Syntax**

```
npu# show access-lists [{<access-list-number (1-199)> |
<access-list-name} ]
```

**Privilege Level**

**10**

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [{<access-list-number (1-199)> \| <access-list-name} ] | Indicates the number or name of the ACL for which configuration information is to be displayed. If you do not provide the ACL number or name, configuration information is displayed for all ACLs. | Optional | N/A | ■ 1-199<br>■ String |

**Display Format (Standard)**

```
Standard IP Access List                 <ACL number>
-------------------------------------------------------------------------
Access List Name(Alias)              :<ACL Name>
Interface List                       : <Interface Name>, <Interface Name>
Status                               : <value>
Source IP address                    : <value>
Source IP address mask               : <value>
Destination IP address               : <value>
Destination IP address mask          : <value>
Rule Action                          : <value>
Packet Match Count                   : <value>
Rule Row Status                      : <value>
```

**Display Format (Extended)**

```
Extended IP Access List          <ACL Number>
----------------------------
Access List Name(Alias)          : <ACL Name>
Interface List                   : <Interface>, <Interface>
Status                           : <value>
Filter Protocol Type             : <value>
Source IP address                : <value>
Filter Source Port               : <value>
Rule Action                      : <value>
QoS Classifier ID                : <value>
Marking rule status              : <value>
```

**Command Modes**

Global command mode

## 4.3.10 Configuring the ASN-GW Functionality

**IMPORTANT**

Execute the procedures described in this section only if you are operating the NPU in the ASN-GW mode. Skip this section if you are operating the NPU in the Transparent mode.

The ASN-GW functionality indicates that the NPU executes the following functions:

- Network Decision Point (NWDP): Includes the following non-bearer plane functions:
  - » Implementation of EAP Authenticator and AAA client
  - » Termination of RADIUS protocol against the selected CSN AAA server (home or visited AAA server) for MS authentication and per-MS policy profile retrieval
  - » Storage of the MS policy profile for as long as the MS is authenticated/authorized and remains in the ASN controlled by the specific ASN-GW
  - » Generation of authentication key material

- QoS service flow authorization entity
- AAA accounting client

- Network Enforcement Point (NWEP) functions: Includes the following bearer plane functions:
  - Classification of downlink data into generic routing encapsulation (GRE) tunnels
  - Packet header suppression functionality
  - DHCP functionality
  - Handover functionality

The ASN-GW functionality is disabled if you are operating the NPU in the Transparent mode. If you are operating the NPU in the ASN-GW mode, you can choose to operate the NPU in either of the following modes:

- With HA support, that is, MIP services are implemented (not supported in the current release)
- Without HA support, that is, MIP services are not implemented.

**IMPORTANT**

The ASN-GW mode with HA support is not implemented because MIP services are not supported in the current release.

The following table lists the tasks for configuring the ASN-GW functionality.

**Table 4-20: Tasks to be Executed for Configuring the ASN-GW Functionality**

| Task | Required for Operating the NPU with HA Support | Required for Operating the NPU without HA Support |
|---|---|---|
| "Configuring the Next-hop IP Address-Network ID Mapping" on page 243 | Yes | Yes |

**Table 4-20: Tasks to be Executed for Configuring the ASN-GW Functionality**

| | | |
|---|---|---|
| "Configuring the IGMP Functionality" on page 246<br><br>**Note**: This feature is not supported in the current release. | Yes | Yes |
| "Configuring the MIP-Foreign Agent Functionality" on page 250<br><br>**Note**: This feature is not supported in the current release. | Yes | No |
| "Configuring the Proxy-MIP Client Functionality" on page 252<br><br>**Note**: This feature is not supported in the current release. | Yes | No |
| "Configuring the ASN Interface" on page 255 | Yes | Yes |
| "Managing the Authenticator Function" on page 257 | Yes | Yes |
| "Configuring the Data Path Function" on page 262 | Yes | Yes |
| "Configuring the Context Function" on page 266 | Yes | Yes |
| "Configuring the MS State Change Functionality" on page 269 | Yes | Yes |
| "Configuring the Connectivity Service Network Interface" on page 273 | Yes | Yes |
| "Configuring Bearer Plane QoS Marking Rules" on page 275 | Yes | Yes |

**Table 4-20: Tasks to be Executed for Configuring the ASN-GW Functionality**

| | | |
|---|---|---|
| "Managing Service Interfaces" on page 285 | Yes | Yes |
| "Configuring the AAA Client Functionality" on page 291 | Yes | Yes |
| "Managing Service Groups" on page 301 | Yes | Yes |
| "Configuring the Service Flow Authorization Functionality" on page 316 | Yes<br>(Configure only DHCP Proxy for a service group) | Yes<br>(Configure DHCP server, proxy or relay for a service group) |
| "Configuring PHS Rules" on page 363 | Yes | Yes |

### 4.3.10.1 Configuring the Next-hop IP Address-Network ID Mapping

The NPU maintains the mapping of the BS network ID to the next-hop IP address. The next-hop IP address can be the IP address of an intermediate ASN-GW or the destination BS. Using this mapping, the NPU resolves the BS-ID to IP address.

This section describes the commands to be used for:

- "Configuring the Next-hop IP Address" on page 243
- "Displaying the Next-hop IP Address-Network ID Mapping" on page 245
- "Displaying the Next-hop IP Address-Network ID Mapping" on page 245

#### 4.3.10.1.1 Configuring the Next-hop IP Address

To map the next-hop IP address for a specific network ID, run the following command:

```
npu(config)# idip <nw-id> <next-hop-ipaddr>
```

For example, run the following command to map the MAC address of the BS with the next-hop IP address:

```
npu(config)# idip 112233445566 10.0.0.1
```

**NOTE**

Refer to Section 4.3.10.2.1 for a list of existing next-hop IP address-network ID mappings.

**Command Syntax**

```
npu(config)# idip <nw-id> <next-hop-ipaddr>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <nw-id> | Denotes the BS ID. This parameter is a MAC address, and should be specified without colons. | Mandatory | N/A | 6-byte ID |
| <next-hop-ipaddr> | Denotes the next hop IP address for a particular BS. | Mandatory | N/A | Valid IP Address |

**Command Modes**

Global configuration mode

### 4.3.10.1.2 Deleting Next-hop IP Address-Network ID Mappings

To delete a specific or all next-hop IP address-network ID mappings, run the following command:

```
npu(config)# no idip [<nw-id>]
```

**CAUTION**

Specify the network ID if you want to delete a specific next-hop IP address-network ID mapping. Otherwise all the configured mappings are deleted.

**Command Syntax**

```
npu(config)# no idip [<nw-id>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <nw-id> | Denotes the network ID(s) for which an IDIP context is to be removed.<br><br>Specify this parameter only if you want to delete a specific network ID.<br><br>If you do not specify a value for this parameter, all configured network IDs are deleted. | Mandatory | N/A | 6-byte ID |

**Command Modes**

Global configuration mode

### 4.3.10.1.3 Displaying the Next-hop IP Address-Network ID Mapping

To display the next-hop-IP address mapped to a network ID or all network IDs, run the following command:

**npu# show idip** [<nw-id>]

Specify the network ID if you want to display a particular the next-hop-IP address-network ID mapping. Do not specify a value for this parameter if you want to view all the next-hop-IP address-network ID mappings.

**Command Syntax**

**npu# show idip** [<nw-id>]

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<nw-id>] | Denotes the network ID (s) for which you want to view the next-hop IP addresses already mapped to it.<br><br>Specify a value for this parameter if you want to view the next-hop IP address(es) defined for a specific network ID. If you do not specify any value for this parameter, all the existing entries for mappings of network IDs-next-hop IP addresses are displayed. | Optional | N/A | 6-byte ID |

**Display Format**

```
nw-id        next-hop-ip address
<Network ID 1>    <Ip Address>
<Network ID 2>    <Ip Address>
```

**Command Modes**

Global command mode

## 4.3.10.2 Configuring the IGMP Functionality

**IMPORTANT**

The IGMP functionality is not supported in the current release.

The NPU serves as the IGMP proxy server between a group of MSs and the multicast router. In addition, it serves as a router for all MSs that are connected to it. It receives periodic IGMP reports for all MSs that are members of a multicast group. Based on these reports, the NPU maintains a database of members. Each time there is a change in the membership database, because of a member leaving or joining the group, the NPU sends a report to the multicast router. The NPU also serves as a host for the multicast router and sends membership reports in response to membership queries.

This section describes the commands to be used for:


- "Configuring IGMP Parameters" on page 247
- "Restoring the Default Configuration Parameters for the IGMP Functionality" on page 248
- "Displaying IGMP Configuration Information" on page 248
- "Displaying IGMP Membership Information" on page 249


### 4.3.10.2.1 Configuring IGMP Parameters

To configure the IGMP functionality, run the following command:

```
npu(config)# igmp [mcastrouter-version <version>] [robustness
<retransmissions>] [unsolicit-report-interval <timeout>]
[query-delaytime <timeout>]
```

**NOTE**

You can display configuration information for the IGMP functionality. For details, refer to Section 4.3.10.2.3.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config)# igmp [mcastrouter-version <version>] [robustness
<retransmissions>] [unsolicit-report-interval <timeout>] [query-delaytime
<timeout>]
```

**Privilege Level**

15

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [mcastrouter-version <version>] | Denotes the IGMP version of the multicast router. | Optional | IGMPv3 | ■ IGMPv2<br>■ IGMPv3 |

| | | | | | |
|---|---|---|---|---|---|
| | `[robustness <retransmissions>]` | Determines the number of retransmissions of the IGMP reports sent by the NPU. | Optional | 2 | 1 - 2^8 |
| | `[unsolicit-report-interval <timeout>]` | Denotes the interval, in seconds, between successive retransmissions of unsolicited IGMP reports sent by the NPU. | Optional | 1 | 1 - 100 |
| | `[query-delaytime <timeout>]` | Denotes the interval, in seconds, between general queries sent by the multicast router. | Optional | 125 | 1 - 200 |

**Command Modes** Global configuration mode

### 4.3.10.2.2 Restoring the Default Configuration Parameters for the IGMP Functionality

To restore the default configuration for the IGMP functionality, run the following command:

```
npu(config)# no igmp [mcastrouter-version] [robustness]
[unsolicit-report-interval] [query-delaytime]
```

**NOTE**

Refer to Section 4.3.10.2.1 for a description and default values of these parameters.

**Command Syntax**

```
npu(config)# no igmp [mcastrouter-version] [robustness]
[unsolicit-report-interval] [query-delaytime]
```

**Privilege Level** 15

**Command Modes** Global configuration mode

### 4.3.10.2.3 Displaying IGMP Configuration Information

To display configuration information for the IGMP functionality, run the following command:

**npu# show igmp**

| | |
|---|---|
| **Command Syntax** | **npu(config)# show igmp** |
| **Privilege Level** | 1 |
| **Display Format** | IGMP Configuration:<br>mcastrouter-version = <value> robustness = <value><br>unsolicit-report-interval = <value><br>query-delaytime = <value> |
| **Command Modes** | Global command mode |

#### 4.3.10.2.4 Displaying IGMP Membership Information

To display dynamic multicast group membership information, run the following command:

**npu# show igmp-membership**

| | |
|---|---|
| **Command Syntax** | **npu# show igmp-membership** |
| **Command Syntax** | 1 |
| **Display Format** | IGMP Membership :<br>GrpMulticast-addr  Src-addrlist<br><value>  <value> <value> …. |
| **Command Modes** | Global configuration mode |

## 4.3.10.3 Configuring the MIP-Foreign Agent Functionality

**IMPORTANT**

The MIP-Foreign Agent functionality is not supported in the current release.

When the MS is MIP-enabled, the NPU serves as the Foreign Agent (FA) for transferring mobile IP messages between the MS and the HA. As the FA, the NPU is responsible for registering the MS in the network. It provides security by using the security associations (MIP keys) between the MS and FA, and FA and HA.

This section describes the commands to be used for:

- "Configuring Parameters for the MIP-FA Functionality" on page 250
- "Restoring the Default Configuration Parameters for the MIP-FA Functionality" on page 251
- "Displaying Configuration Information for the MIP-FA Functionality" on page 252

### 4.3.10.3.1 Configuring Parameters for the MIP-FA Functionality

To configure MIP-FA parameters, run the following command:

```
npu(config)# mip-fa [allowed-mslifetime <timeout>]
[agent-advertisements <no of agent advertisement>]
[advertisement-interval <timeout>]
```

**NOTE**

You can display configuration information for the MIP-FA functionality. For details, refer to Section 4.3.10.3.3.

| | |
|---|---|
| **Command Syntax** | `npu(config)# mip-fa [allowed-mslifetime <timeout>] [agent-advertisements <no of agent advertisement>] [advertisement-interval <timeout>]` |
| **Privilege Level** | 15 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[allowed-mslifetime <timeout>]` | Denotes the maximum period, in seconds, for which the IP address allocated to the MS is active. | Optional | 9000 | 0-9000 |
| `[agent-advertisements <no of agent advertisement>]` | Denotes the maximum number of initial agent advertisements sent to the MS. | Optional | 3 | 0-5 |
| `[advertisement-interval <timeout>]` | Denotes the interval, in seconds, between successive agent advertisements. | Optional | 10 | 5-100 |

**Command Modes** Global configuration mode

### 4.3.10.3.2 Restoring the Default Configuration Parameters for the MIP-FA Functionality

To restore the default configuration for the MIP-FA functionality, run the following command:

**`npu(config)# no mip-fa [allowed-mslifetime] [agent-advertisements] [advertisement-interval]`**

**NOTE**

Refer to Section 4.3.10.3.1 for a description and default values of these parameters.

**Command Syntax** **`npu(config)# no mip-fa [allowed-mslifetime] [agent-advertisements] [advertisement-interval]`**

**Privilege Level** 15

**Command Modes** Global configuration mode

#### 4.3.10.3.3 Displaying Configuration Information for the MIP-FA Functionality

To display configuration information for the MIP-FA functionality, run the following command:

```
npu# show mip-fa
```

| | |
|---|---|
| **Command Syntax** | `npu# show mip-fa` |
| **Privilege Level** | 1 |
| **Display Format** | `MIP-FA Configuration :`<br>`allowed-mslifetime = <value>`<br>`agent-advertisements = <value>`<br>`advertisement-interval = <value>` |
| **Command Modes** | Global command mode |

### 4.3.10.4 Configuring the Proxy-MIP Client Functionality

**IMPORTANT**

The Proxy-MIP client functionality is not supported in the current release.

When the MS is MIP-incapable, the NPU provides the Proxy-MIP (MIP FA) client functionality, and manages MIP registration between the MS and the HA. This section describes the commands to be used for:

- “Configuring Parameters for the PMIP Client Functionality” on page 253
- “Restoring the Default Configuration Parameters for the PMIP Client Functionality” on page 254
- “Displaying Configuration Information for the PMIP Client Functionality” on page 255

### 4.3.10.4.1 Configuring Parameters for the PMIP Client Functionality

Run the following command to configure the PMIP client functionality to specify how registration of a MIP-incapable MS should be managed:

```
npu(config)# mip-client [mslifetime <timeout>] [mslifetime-guard
<percent>] [registration-retries <retransmissions>]
[registration-interval <timeout>]
```

**NOTE**

You can display configuration information for the PMIP client functionality. For details, refer to Section 4.3.10.4.3.

**IMPORTANT**

An error may occur if you provide an invalid for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config)# mip-client [mslifetime <timeout>] [mslifetime-guard
<percent>] [registration-retries <retransmissions>]
[registration-interval <timeout>]
```

**Privilege Level**

15

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [mslifetime <timeout>] | Denotes the maximum period, in seconds, for which the HA will maintain the MIP binding. This information is sent in the MIP registration message. At the end of this period, the NPU de-registers the MS. | Optional | 9000 | 0-9000 |

| | | | | |
|---|---|---|---|---|
| [mslifetime-guard <percent>] | Denotes the period for which the PMIP remains active. The value of this parameter should be a percentage of the mslifetime parameter. At the end of this period, the PMIP attempts re-registration. | Optional | 65% | 0-100 |
| [registration-retries <retransmissions>] | Denotes the maximum number of registration requests that can be sent by the NPU. | Optional | 3 | 0-5 |
| [registration-interval <timeout>] | Denotes the interval between successive requests of an MS, in seconds, within which the MIP registration response should be sent by the HA. | Optional | 10 | 5-100 |

**Command Modes** Global configuration mode

### 4.3.10.4.2 Restoring the Default Configuration Parameters for the PMIP Client Functionality

To restore the default configuration for the PMIP client functionality, run the following command:

**npu(config)# no mip-client [mslifetime] [mslifetime-guard] [registration-retries] [registration-interval]**

**NOTE**

Refer to Section 4.3.10.4.1 for a description and default values of these parameters.

**Command Syntax** **npu(config)# no mip-client [mslifetime] [mslifetime-guard] [registration-retries] [registration-interval]**

**Privilege Level** 15

**Command Modes** Global configuration mode

#### 4.3.10.4.3 Displaying Configuration Information for the PMIP Client Functionality

To display PMIP client configuration information, run the following command:

```
npu# show mip-client
```

| | |
|---|---|
| **Command Syntax** | `npu# show mip-client` |
| **Privilege Level** | 1 |
| **Display Format** | `PMIP-Client Configuration :`<br>`mslifetime = <value>`<br>`mslifetime-guard = <value>`<br>`registration-retries = <value>`<br>`registration-interval = <value>` |
| **Command Modes** | Global command mode |

### 4.3.10.5 Configuring the ASN Interface

The ASN interface is the NPU interface that is exposed towards the BS or another ASN gateway. You can configure ASN interface-specific information, such as the IP address to be used for the NPU to communicate with the BS and other ASN gateways.

This section describes the commands to be used for:


- "Assigning a Pre-configured IP Interface" on page 255
- "Displaying Configuration Information for the ASN Interface" on page 257


#### 4.3.10.5.1 Assigning a Pre-configured IP Interface

To assign a pre-configured IP interface to the ASN side, that is, the R4/R6 interface, run the following command:

```
npu(config)# asnif <ip-intf>
```

For the current release, specify `bearer` as the value of the `ip-intf` parameter. However, the IP address should already be configured for the bearer interface. For details, refer to "Configuring Static Routes" on page 205.

**NOTE**

You can display configuration information for ASN interface. For details, refer to Section 4.3.10.5.2.

**IMPORTANT**

An error may occur if you provide an invalid value for this parameter. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config)# asnif <ip-intf>
```

**Privilege Level**

15

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `asnif <ip-intf>` | Denotes the IP interface that is to be exposed towards the BS and other ASN gateways. Ensure that the IP address for the bearer interface is configured before executing this command.<br><br>**Note**: If you are modifying the ASN interface, save the current configuration (refer Section 4.3.4.1) and reset the NPU (Section 4.2.2.1) for the change to take effect. | Mandatory | N/A | bearer (only the bearer interface is supported in the current release) |

**Command Modes**

Global configuration mode

#### 4.3.10.5.2 Displaying Configuration Information for the ASN Interface

To display the IP interface (R4/R6) of the ASN interface, run the following command:

```
npu# show asnif
```

| | |
|---|---|
| **Command Syntax** | `npu# show asnif` |
| **Privilege Level** | 1 |
| **Display Format** | `ASN Interface Configuration :`<br>`ASN IP Interface = <value>` |
| **Command Modes** | Global command mode |

### 4.3.10.6 Managing the Authenticator Function

The Authenticator function of the NPU manages MS authentication for accessing WiMAX network resources. It also maintains context information for each MS that has accessed or is trying to access the network. For this, it handles all key derivations and distribution. In addition, it uses AAA client functions to send RADIUS messages on the R3 interface.

This section describes the commands to be used for:

- “Configuring Parameters for the Authenticator Function” on page 257
- “Restoring the Default Configuration Parameters for the Authenticator Function” on page 260
- “Displaying Configuration Information for the Authenticator Function” on page 261

#### 4.3.10.6.1 Configuring Parameters for the Authenticator Function

To configure the parameters of the Authenticator function, run the following command:

```
npu(config)# authenticator [eapidreq-retries <retransmissions>]
[eapidreq-interval <timeout>] [ntwentry-holdtime <timeout>]
[eaptransfer-retries <retransmissions>] [eaptransfer-interval
<timeout>] [reauth-attempts <counter>] [reauthcmplt-holdtime
<timeout>] [eaptransfer-roundtrips <counter>] [pmk-lifetime
<timeout>] [pmk-guardtime <timeout>] [authfailure-holdtime
<timeout>] [max-ntwentry <counter>]
```

**NOTE**

You can display configuration information for the Authenticator function. For details, refer to Section 4.3.10.6.3

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config)# authenticator [eapidreq-retries <retransmissions>]
[eapidreq-interval <timeout>] [ntwentry-holdtime <timeout>]
[eaptransfer-retries <retransmissions>] [eaptransfer-interval <timeout>]
[reauth-attempts <counter>] [reauthcmplt-holdtime <timeout>]
[eaptransfer-roundtrips <counter>] [pmk-lifetime <timeout>]
[pmk-guardtime <timeout>] [authfailure-holdtime <timeout>] [max-ntwentry
<counter>]
```

**Privilege Level**

15

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [eapidreq-retries <retransmissions>] | Denotes the number of times the NPU can retransmit the EAP ID request until it receives a EAP ID response. | Optional | 3 | 0-5 |
| [eapidreq-interval <timeout>] | Denotes the period, in milliseconds, for which the NPU should wait for the response to the request for the EAP ID. | Optional | 500 | 10-100000 |

| | | | | |
|---|---|---|---|---|
| [ntwentry-holdtime <timeout>] | Denotes the period, in seconds, within which the MS should be authenticated for initial entry into the network. If the MS is not authenticated within this period, the NPU terminates the request for network entry. | Optional | 5 | 0-100 |
| [eaptransfer-retries <retransmissions>] | Denotes the maximum number of times the MS can attempt for initial entry to the network. If the number of EAP transfers exceeds the value of this parameter, the NPU de-registers the MS. | Optional | 3 | 0-5 |
| [eaptransfer-interval <timeout>] | Denotes the period, in milliseconds, the NPU waits for the EAP identity response. | Optional | 500 | 10 - 100000 |
| [reauth-attempts <counter>] | Denotes the maximum number of times the NPU may handle a an MS/network-initiated re-authentication request. When the number of re-authentication attempts exceeds the value of this parameter, the MS is de-registered. | Optional | 3 | 0-10 |
| [reauthcmplt-holdtime <timeout>] | Denotes the period, in milliseconds, within which, re-authentication of the MS should be complete. If the MS is not authenticated within this period, the NPU reinitiates MS authentication. | Optional | 5000 | 10 - 100000 |
| [eaptransfer-roundtrips <counter>] | Denotes the number EAP roundtrips in one authentication/re-authentication process. | Optional | 4294967295 | 0 - 4294967295 |
| [pmk-lifetime <timeout>] | Denotes the period, in seconds, for which the MS authentication key is valid. At the end of this period, the NPU de-registers the MS. | Optional | 3600 | 60-86400 |

| | | | | | |
|---|---|---|---|---|---|
| | [pmk-guardtime <timeout>] | Denotes the duration of the guard timer for the MS authentication keys. the NPU initiates re-authentication for the MS after the pmk guard timer has expired. (The value of this timer is pmk-lifetime - pmk-guardtime.)<br><br>If the value of this parameter is 0, the guard timer is not started. | Optional | 0 | 0-86400 |
| | [authfailure-holdtime <timeout>] | Denotes the period, in seconds, for which the MS context is retained after authentication failure. | Optional | 0 | 1-1024 |
| | [max-ntwentry <counter>] | Denotes the maximum number of times that the NPU may handle a network entry request from an MS, after prior attempts for that MS has already failed. After the NPU has handled max-ntwentry number of attempts and its value is 0, the MS is assigned the unauthenticated mode. | Optional | 3 | 0-10 |

**Command Modes** Global configuration mode

### 4.3.10.6.2 Restoring the Default Configuration Parameters for the Authenticator Function

To restore the default configuration for the Authenticator function, run the following command:

```
npu(config)# no authenticator [eapidreq-retries]
[eapidreq-interval] [ntwentry-holdtime] [eaptransfer-retries]
[eaptransfer-interval] [reauth-attempts] [reauthcmplt-holdtime]
[eaptransfer-roundtrips] [pmk-lifetime] [pmk-guardtime]
[authfailure-holdtime] [max-ntwentry]
```

**NOTE**

Refer to Section 4.3.10.6.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config)# no authenticator [eapidreq-retries] [eapidreq-interval] [ntwentry-holdtime] [eaptransfer-retries] [eaptransfer-interval] [reauth-attempts] [reauthcmplt-holdtime] [eaptransfer-roundtrips] [pmk-lifetime] [pmk-guardtime] [authfailure-holdtime] [max-ntwentry]** |
| **Privilege Level** | 15 |
| **Command Modes** | Global configuration mode |

### 4.3.10.6.3 Displaying Configuration Information for the Authenticator Function

To display configuration information for the Authenticator function, run the following command:

**npu# show authenticator**

| | |
|---|---|
| **Command Syntax** | **npu# show authenticator** |
| **Privilege Level** | 1 |

**Display Format**

```
Authenticator Function Configuration :
eapidreq-retries = <value>
eapidreq-interval = <value>
ntwentry-holdtime = <value>
eaptransfer-retries = <value>
eaptransfer-interval = <value>
reauth-attempts = <value>
reauthcmplt-holdtime = <value>
eaptransfer-roundtrips = <value>
pmk-lifetime = <value>
pmk-guardtime = <value>
authfailure-holdtime = <value>
max-ntwentry = <value>
```

**Command Modes**

Global command mode

## 4.3.10.7 Configuring the Data Path Function

The Data Path function controls the creation, maintenance, and deletion of data paths within the NPU. This section describes the commands to be used for:

- “Configuring Parameters for the Data Path Function” on page 262
- “Restoring the Default Parameters for the Data Path Function” on page 265
- “Displaying Configuration Information for the Data Path Function” on page 266

### 4.3.10.7.1 Configuring Parameters for the Data Path Function

To configure the parameters for the data path function, run the following command:

**npu(config)# datapath** [**initpathregreq-retries** <retransmissions>] [**initpathregreq-interval** <timeout>] [**msderegreq-retries** <retransmissions>] [**msderegreq-interval** <timeout>] [**pathregreq-retries** <retransmissions>] [**pathregreq-interval** <timeout>] [**pathregrsp-retries** <retransmissions>]

**[pathregrsp-interval** <timeout>] [**pathregstart-interval** <timeout>] [**mipwaitdhcp-holdtime** <timeout>]

**NOTE**

You can display configuration information for the data path function. For details, refer to Section 4.3.10.7.3.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

**npu(config)# datapath** [**initpathregreq-retries** <retransmissions>] [**initpathregreq-interval** <timeout>] [**msderegreq-retries** <retransmissions>] [**msderegreq-interval** <timeout>] [**pathregreq-retries** <retransmissions>] [**pathregreq-interval** <timeout>] [**pathregrsp-retries** <retransmissions>] [**pathregrsp-interval** <timeout>] [**pathregstart-interval** <timeout>] [**mipwaitdhcp-holdtime** <timeout>]

**Privilege Level**

15

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [initpathregreq-retries <retransmissions>] | Denotes the maximum number of initial path registration request retransmissions that may be sent by the NPU. After the number of retransmissions has exceeded the value of this parameter, the MS de-registration procedure is initiated. | Optional | 3 | 0-5 |

| | | | | |
|---|---|---|---|---|
| [initpathregreq-interval <timeout>] | Denotes the interval, in milliseconds, after which the request for initial path registration should be complete. If the initial path registration request is not completed within this period, the NPU may retransmit the initial path registration request. | Optional | 1 | 10 - 3000 |
| [msderegreq-retries <retransmissions>] | Denotes the maximum number of MS deregistration request retransmissions, after which the MS is de-registered. | Optional | 3 | 0-5 |
| [msderegreq-interval <timeout>] | Denotes the MS deregistration response timeout, in milliseconds. | Optional | 30 | 5-500 |
| [pathregreq-retries <retransmissions>] | Denotes the maximum number of times the NPU may retransmit the path registration request. | Optional | 3 | 0-5 |
| [pathregreq-interval <timeout>] | Denotes the period, in milliseconds, with which the NPU should wait for the path registration response. If a response is not received within this period, the NPU retransmits the request. | Optional | 10 | 5- 100 |
| [pathregrsp-retries <retransmissions>] | Denotes the maximum number of times the NPU may retransmit the path response. | Optional | 3 | 0-5 |
| [pathregrsp-interval <timeout>] | Denotes the period, in milliseconds, within which the NPU should wait for an acknowledgement for the registration response. If a response is not received within this period, the NPU retransmits the response. | Optional | 10 | 5- 100 |

| | | | | | |
|---|---|---|---|---|---|
| | [pathregstart-interval <timeout>] | Indicates the period, in milliseconds, within which the path registration procedure is initiated, after the path pre-registration procedure is complete. If the path registration procedure is not completed within the period specified by this parameter, the MS is de-registered. | Optional | 1000 | 5- 2000 |
| | [mipwaitdhcp-holdtime <timeout>] | Denotes the period, in seconds, for allocating the IP address, after the path registration procedure is complete. | Optional | 0 | 0 - 120 |

**Command Modes** Global configuration mode

### 4.3.10.7.2 Restoring the Default Parameters for the Data Path Function

To restore the default configuration for the data path function, run the following command:

```
npu(config)# no datapath [initpathregreq-retries]
[initpathregreq-interval] [msderegreq-retries]
[msderegreq-interval] [pathregreq-retries] [pathregreq-interval]
[pathregrsp-retries] [pathregrsp-interval] [pathregstart-interval]
[mipwaitdhcp-holdtime]
```

**NOTE**

Refer to Section 4.3.10.7.1 for a description and default values of these parameters.

**Command Syntax**

```
npu(config)# no datapath [initpathregreq-retries]
[initpathregreq-interval] [msderegreq-retries] [msderegreq-interval]
[pathregreq-retries] [pathregreq-interval] [pathregrsp-retries]
[pathregrsp-interval] [pathregstart-interval] [mipwaitdhcp-holdtime]
```

**Privilege Level** 15

| | |
|---|---|
| **Command Modes** | Global configuration mode |

#### 4.3.10.7.3 Displaying Configuration Information for the Data Path Function

To display configuration information for the Data Path function, run the following command:

```
npu# show datapath
```

| | |
|---|---|
| **Command Syntax** | `npu# show datapath` |
| **Privilege Level** | 1 |
| **Display Format** | `Data Path Function Configuration :`<br>`initpathregreq-retries = <value>`<br>`initpathregreq-interval = <value>`<br>`msderegreq-retries = <value>`<br>`msderegreq-interval = <value>`<br>`pathregreq-retries = <value>`<br>`pathregreq-interval = <value>`<br>`pathregrsp-retries = <value>`<br>`pathregrsp-interval = <value>`<br>`pathregstart-interval = <value>`<br>`mipwaitdhcp-holdtime <value>` |
| **Command Modes** | Global command mode |

### 4.3.10.8 Configuring the Context Function

The context function manages the contexts of various authenticated MSs. You can specify parameters pertaining to context creation and reports. This section describes the commands to be used for:

■ “Configuring the Parameters for the Context Function” on page 267

- "Restoring the Default Configuration Parameters for the Context Function" on page 268
- "Displaying Configuration Information for the Context Function" on page 269


### 4.3.10.8.1 Configuring the Parameters for the Context Function

To configure the parameters for the context function, run the following command:

```
npu(config)# contextfn [contextreq-retries <retransmissions>]
[contextreq-interval <timeout>] [contextrprt-retries
<retransmissions>] [contextrprt-interval <timeout>]
```

**NOTE**

You can display configuration information for the context function. For details, refer to Section 4.3.10.8.3

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config)# contextfn [contextreq-retries <retransmissions>]
[contextreq-interval <timeout>] [contextrprt-retries <retransmissions>]
[contextrprt-interval <timeout>]
```

**Privilege Level**

15

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [contextreq-retries <retransmissions>] | Denotes the maximum number of times the NPU will retransmit a context request. | Optional | 3 | 1-5 |

| | | | | | |
|---|---|---|---|---|---|
| | `[contextreq-interval <timeout>]` | Denotes the period, in milliseconds, for which the NPU waits for a response to the context request. If the NPU does not receive a response to this request within the period specified by this timer, the NPU retransmits this request. | Optional | 10 | 5 - 100 |
| | `[contextrprt-retries <retransmissions>]` | Denotes the maximum number of times, the NPU retransmits the context report. | Optional | 3 | 0-5 |
| | `[contextrprt-interval <timeout>]` | Denotes the period, in milliseconds, for which the NPU waits for the context report acknowledgement. At the end of this period, the NPU retransmits the context report. | Optional | 3 | 0-5 |

**Command Modes** Global configuration mode

### 4.3.10.8.2 Restoring the Default Configuration Parameters for the Context Function

To restore the default configuration for the context function, run the following command:

```
npu(config)# no contextfn [contextreq-retries]
[contextreq-interval] [contextrprt-retries] [contextrprt-interval]
```

**NOTE**

Refer to Section 4.3.10.8.1 for a description and default values of these parameters.

**Command Syntax** `npu(config)# no contextfn [contextreq-retries] [contextreq-interval] [contextrprt-retries] [contextrprt-interval]`

**Privilege Level** 15

| | |
|---|---|
| **Command Modes** | Global configuration mode |

### 4.3.10.8.3 Displaying Configuration Information for the Context Function

To display configuration information for the context function, run the following command:

```
npu# show contextfn
```

| | |
|---|---|
| **Command Syntax** | `npu# show contextfn` |
| **Privilege Level** | 1 |
| **Display Format** | `Context Function Configuration :`<br>`contextreq-retries = <value>`<br>`contextreq-interval = <value>`<br>`contextrprt-retries = <value>`<br>`contextrprt-interval = <value>` |
| **Command Modes** | Global command mode |

## 4.3.10.9 Configuring the MS State Change Functionality

The MS state change functionality manages MS states within an MS context. This section describes the commands to be used for:


- "Configuring Parameters for the MS State Change Functionality" on page 270
- "Restoring the Default Configuration Parameters for the MS State Change Functionality" on page 271
- "Displaying Configuration Information for the MS State Change Functionality" on page 272

### 4.3.10.9.1 Configuring Parameters for the MS State Change Functionality

To configure the parameters for the MS State Change functionality, run the following command:

**npu(config)# msscfn** [**msscrsp-retries** <retransmissions>] [**msscrsp-interval** <timeout>] [**sbc-holdtime** <timeout>] [**reg-holdtime** <timeout>] [**msscdrctv-retries** <retransmissions>] [**msscdrctv-interval** <timeout>]

**NOTE**

You can display configuration information for the MS state change functionality. For details, refer to Section 4.3.10.9.3.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

**npu(config)# msscfn** [**msscrsp-retries** <retransmissions>] [**msscrsp-interval** <timeout>] [**sbc-holdtime** <timeout>] [**reg-holdtime** <timeout>] [**msscdrctv-retries** <retransmissions>] [**msscdrctv-interval** <timeout>]

**Privilege Level**

15

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [msscrsp-retries <retransmissions>] | Denotes the maximum number of times, the NPU retransmits the MS state change response. | Optional | 3 | 1-5 |
| [msscrsp-interval <timeout>] | Denotes the period, in milliseconds for which the NPU waits for an acknowledgement for the MS state change response. If the NPU does not receive an acknowledgement within this period, it retransmits the MS state change response. | Optional | 10 | 5- 500 |

| | | | | |
|---|---|---|---|---|
| [sbc-holdtime <timeout>] | Denotes the period, in milliseconds, within which the basic capabilities negotiation procedure should be completed. At the end of this period, the NPU starts the authentication/ registration procedure for the MS, depending on accepted authentication policy. | Optional | 5 | 0-100 |
| [reg-holdtime <timeout>] | Denotes the interval, in seconds, for the MS registration procedure timeout. After this interval, the NPU changes the MS state to the registered state, and initiates the data path creation procedure (for authenticated MSs). | Optional | 5 | 0-100 |
| [msscdrctv-retries <retransmissions>] | Denotes the maximum number of times, the NPU may retransmit the MS state change directive. | Optional | 3 | 0-5 |
| [msscdrctv-interval <timeout> | Denotes the period, in milliseconds, for which the NPU waits for an acknowledgement for the MS state change directive. If the NPU does not receive an acknowledgment within this period, it retransmits the state change directive. | Optional | 10 | 0-500 |

**Command Modes** Global configuration mode

### 4.3.10.9.2 Restoring the Default Configuration Parameters for the MS State Change Functionality

To restore the default configuration for the MS State Change functionality, run the following command:

```
npu(config)# no msscfn [msscrsp-retries] [msscrsp-interval]
[sbc-holdtime] [reg-holdtime] [msscdrctv-retries]
[msscdrctv-interval]
```

**NOTE**

Refer to Section 4.3.10.9.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config)# no msscfn [msscrsp-retries] [msscrsp-interval] [sbc-holdtime] [reg-holdtime] [msscdrctv-retries] [msscdrctv-interval]** |
| **Privilege Level** | 15 |
| **Command Modes** | Global configuration mode |

### 4.3.10.9.3 Displaying Configuration Information for the MS State Change Functionality

To display configuration information for the MS state change functionality, run the following command:

**npu# show msscfn**

| | |
|---|---|
| **Command Syntax** | **npu# show msscfn** |
| **Privilege Level** | 1 |
| **Display Format** | MS State Change Function Configuration :<br>msscrsp-retries = <value><br>msscrsp-interval = <value><br>sbc-holdtime = <value><br>reg-holdtime = <value><br>msscdrctv-retries = <value><br>msscdrctv-interval = <value |
| **Command Modes** | Global command mode |

## 4.3.10.10 Configuring the Connectivity Service Network Interface

**IMPORTANT**

Skip this task. The MIP functionality is not supported in the current release.

The Connectivity Service Network (CSN) interface provides IP connectivity services for a set of subscribers. The gateway uses the CSN interface for R3 control traffic and R3 data traffic towards the core network. You can configure the parameters for the IP interface to be used as the network interface for R3 control traffic.

This section describes the commands to be used for:

- "Configuring Parameters for the CSN Interface" on page 273
- "Restoring the Default Configuration Parameters of the CSN Interface" on page 274
- "Displaying Configuration Information for the CSN Interface" on page 275

### 4.3.10.10.1 Configuring Parameters for the CSN Interface

To configure the CSN parameters, run the following command:

```
npu(config)# csnif [ip-intf <ip-intf>] [tun-mtu <size>] [tun-chksm]
```

**NOTE**

You can display configuration information for the CSN Interface. For details, refer to Section 4.3.10.10.3.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config)# csnif [ip-intf <ip-intf>] [tun-mtu <size>] [tun-chksm]` |
| **Privilege Level** | 15 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[ip-intf <ip-intf>]` | Denotes a pre-defined IP interface to be used as a network interface for R3 control traffic and R3 data traffic.<br><br>**Note**: If you are modifying the CSN interface, save the current configuration (refer Section 4.3.4.1) and reset the NPU (Section 4.2.2.1) for the change to take effect. | Mandatory | N/A | bearer |
| `[tun-mtu <size>]` | Denotes the MTU for the IP-in-IP tunnel (used for R3 data traffic) on this interface. | Optional | 1450 | 1 - $2^{32}$ -1 |
| `[tun-chksm]` | Indicates that the tunnel checksum feature is enabled. If this feature is enabled, the checksum of the inner header is to be verified. | Optional | By default, this feature is disabled. | The presence/absence of this parameter indicates that the tunnel checksum feature is enabled/disabled. |

**Command Modes**

Global configuration mode

### 4.3.10.10.2 Restoring the Default Configuration Parameters of the CSN Interface

To restore the default configuration for the CSN interface, run the following command. This command can also be used to disable the tunnel-checksum feature.

```
npu(config)# no csnif [tun-mtu] [tun-chksm]
```

**NOTE**

Refer to Section 4.3.10.10.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config)# no csnif [tun-mtu] [tun-chksm]** |
| **Privilege Level** | 15 |
| **Command Modes** | Global configuration mode |

### 4.3.10.10.3 Displaying Configuration Information for the CSN Interface

To display configuration information for the CSN interface, run the following command:

**npu# show csnif**

| | |
|---|---|
| **Command Syntax** | **npu# show csnif** |
| **Privilege Level** | 1 |
| **Display Format** | CSN Interface Configuration :<br>ip-intf = <value><br>tun-mtu = <value><br>tun-chksm = <value> |
| **Command Modes** | Global command mode |

## 4.3.10.11 Configuring Bearer Plane QoS Marking Rules

The bearer plane consists of tunnels between the ASN and CSN, and the BS and the NPU. R3 includes the bearer plane methods such as tunneling for enabling data transfer between the CSN and the ASN. R6 consists of the bearer plane protocols that implement the intra-ASN data path between the BS and the NPU.

You can define QoS marking rules for the bearer plane, based on parameters such as traffic priority, and the type of service, media, and interface.

**To configure one or more QoS bearer plane marking rules:**

1. Enable the bearer plane QoS marking rules configuration mode (refer to Section 4.3.10.11.1)
2. You can now execute any of the following tasks:
   - » Configure the output parameters for bearer plane QoS marking rules (refer to Section 4.3.10.11.2)
   - » Restore the default parameters for bearer plane QoS marking rules (refer to Section 4.3.10.11.3)
3. Terminate the bearer plane QoS marking rules configuration mode (refer to Section 4.3.10.11.4)

In addition, you can, at any time, display configuration information (refer to Section 4.3.10.11.6)or delete an existing bearer plane QoS marking rule (refer to Section 4.3.10.11.5).

The following example illustrates the (sequence of) commands for enabling the QoS marking rules configuration mode, configuring the parameters of a QoS marking rule, and then terminating the QoS marking rules configuration mode:

```
npu(config)# bearerqos rule_1 0 3 5 data 1

npu(config-bqos)# config outer-dscp 3 vlan-priority 4 qos enable

npu(config-bqos)# exit
```

### 4.3.10.11.1 Enabling the Bearer Plane QoS Marking Rule Configuration Mode\Creating a Bearer Plane QoS Marking Rule

To configure the parameters for the bearer plane QoS marking rules, first enable the bearer plane QoS marking rule configuration mode. Run the following command to enable the bearer plane QoS marking rules configuration mode. You can also use this command to create a new bearer plane QoS marking rule.

```
npu(config)# bearerqos <qos-alias> [<intf-type> <srvc-type>
<trfc-priority> <media-type> <inner-dscp>]
```

**NOTE**

You can display configuration information for the bearer plane QoS marking rules. For details, refer to Section 4.3.10.11.6.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

If you use this command to create a new QoS marking rule, the configuration mode for this rule is automatically enabled, after which you can execute any of the following tasks:

- Configure the output parameters for bearer plane QoS marking rules (refer to Section 4.3.10.11.2)
- Restore the default parameters for bearer plane QoS marking rules (refer to Section 4.3.10.11.3)

After executing the above tasks, you can terminate the bearer plane QoS marking rules configuration mode (refer to Section 4.3.10.11.4) and return to the global configuration mode.

**NOTE**

The granularity of the QoS definition to be applied to packets transmitted on the bearer plane depends upon the number of parameters that you specify. If any parameter is to be excluded from the definition, specify the value 255 for that parameter.

| | |
|---|---|
| **Command Syntax** | **npu(config)# bearerqos <qos-alias> [<intf-type> <srvc-type> <trfc-priority> <media-type> <inner-dscp>]** |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<qos-alias>` | Denotes the QoS alias of the QoS marking rule for which you want to enable the bearer plane QoS marking rules configuration mode. If you want to create a new QoS marking rule, specify a new alias and define the type of interface, service, and traffic priority that is applicable for that rule. | Mandatory | N/A | String |
| `<intf-type>` | Denotes the type of interface for which you are defining the bearer plane QoS rule. | Optional | 255 | ■ 0: Indicates the R4 (internal) interface<br>■ 1: Indicates the R3 (external interface))<br>■ 255: Indicates that the parameter should be ignored for packets transmitted on both internal and external interfaces. |

| | | | | |
|---|---|---|---|---|
| <srvc-type> | Denotes the type of service provided as an input parameter for the bearer plane QoS rule. This parameter is used to match the outer-DSCP and VLAN-priority values for a service flow<br><br>The current release supports only value 3 that represents that Best Effort (BE) data delivery type is supported. | Optional | 255 | ■ 0-5, where 3 indicates Best Effort (BE) and is the only supported value.<br><br>■ 255: Indicates that the parameter should be ignored for packets transmitted on both internal and external interfaces. |
| <trfc-priority> | Denotes the traffic priority provided as an input parameter for the bearer plane QoS rule. This parameter is used to match the outer-DSCP and VLAN-priority values for a service flow. | Optional | 255 | ■ 0-7, where 7 is highest<br><br>■ 255: Indicates that the parameter should be ignored for packets transmitted on both internal and external interfaces. |
| <media-type> | Denotes the media type provided as an input parameter for the bearer plane QoS rule. This parameter is used to match the outer-DSCP and VLAN-priority values for a service flow. | Optional | ANY | ■ String<br><br>■ ANY: Indicates that the parameter should be ignored for packets transmitted on both internal and external interfaces. |

| | | | | | |
|---|---|---|---|---|---|
| | <inner-dscp>] | Denotes the inner DSCP value of the traffic on the bearer plane. | Optional | 255 | ■ 0-63<br>■ 255: Indicates that the parameter should be ignored for packets transmitted on both internal and external interfaces. |

**Command Modes** Global configuration mode

### 4.3.10.11.2 Configuring the Output Parameters for Bearer Plane QoS Marking Rules

After enabling the bearer plane QoS marking rules configuration mode you can configure the output parameters that should be applied on packets (that are created using the parameters specified in Section 4.3.10.11.1). Output parameters are a combination of the Outer-DSCP and VLAN priority values. These are populated in the outer DSCP and VLAN priority fields in the IP and Ethernet headers of these packets.

**IMPORTANT**

Enable the bearer plane QoS marking rule that you are configuring. By default, all bearer plane QoS marking rules are disabled.

Run the following command to configure the output parameters for this bearer plane QoS marking rule:

```
npu(config-bqos)# config [outer-dscp <dscp>] [vlan-priority
<priority>] [qos enable]
```

**NOTE**

You can display configuration information for the bearer plane QoS marking rules. For details, refer to Section 4.3.10.11.6.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-bqos)# config [outer-dscp <dscp>] [vlan-priority <priority>]
[qos enable]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [outer-dscp <dscp>] | Denotes the Differentiated Service Code Point (DSCP) value to be used for marking the packets, if the packet complies with the marking rules specified in Section 4.3.10.11.1. | Optional | 0 | ■ 0-63<br>■ 255: Indicates that the parameter should be ignored for packets transmitted on the bearer plane |
| [vlan-priority <priority>] | Denotes the VLAN priority to be assigned to the packets if the packet meets the requirements of the marking rules specified in Section 4.3.10.11.1. | Optional | 0 | ■ 0-7, where 7 is the highest<br>■ 255: Indicates that the parameter should be ignored for packets transmitted on both internal and external interfaces. |

| | | | | | |
|---|---|---|---|---|---|
| | `[qos enable]` | Indicates whether this QoS marking rule should be enabled. The absence of this flag indicates that this QoS flag is disabled. By default, a bearer plane QoS marking rule is disabled.<br><br>If you enable this QoS marking rule, packets on bearer plane that were created using the parameters in Section 4.3.10.11.1, the Outer DSCP and VLAN Priority fields in the IP header and Ethernet header, respectively are populated with the values you specify for the `outer-dscp` and `vlan-priority` parameters. | Optional | By default, the QoS marking rule is disabled. | The presence/absence of this flag indicates that this QoS flag is enabled/disabled. |

**Command Modes** Bearer plane QoS marking rules configuration mode

### 4.3.10.11.3 Restoring the Default Configuration Parameters for the Bearer Plane QoS Output Marking Rules

Run the following command to restore the default configuration for this bearer plane QoS marking rule:

```
npu(config-bqos)# no {outer-dscp | vlan-priority | qos enable}
```

When you execute this command, it automatically disables this QoS marking rule.

**NOTE**

Refer to Section 4.3.10.11.2 for a description and default values of these parameters.

**Command Syntax** `npu(config-bqos)# no {outer-dscp | vlan-priority | qos enable}`

**Privilege Level** 10

| | |
|---|---|
| **Command Modes** | Bearer plane QoS marking rules configuration mode |

### 4.3.10.11.4 Terminating the QoS Marking Rules Configuration Mode

Run the following command to terminate the marking rules configuration mode:

```
npu(config-bqos)# exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-bqos)# exit` |
| **Privilege Level** | 10 |
| **Command Modes** | Bearer plane QoS marking rules configuration mode |

### 4.3.10.11.5 Deleting Bearer Plane QoS Marking Rules

Run the following command to delete the a QoS marking rule:

```
npu(config)# no bearerqos [<qos-alias>]
```

**CAUTION**

Specify the QoS alias if you want to delete a specific bearer plane qoS marking rule. Otherwise all the configured bearer plane QoS marking rules are deleted.

| | |
|---|---|
| **Command Syntax** | `npu(config)# no bearerqos [<qos-alias>]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<qos-alias>]` | Denotes the QoS alias of the bearer QoS marking rule that you want to delete. Specify a value for this parameter if you want to delete a specific bearer QoS marking rule.<br><br>Do not specify a value for this parameter if you want to delete all bearer QoS marking rules. | Optional | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.11.6 Displaying Configuration Information for the Bearer Plane QoS Marking Rules

To display configuration information for specific or all bearer plane QoS marking rules, run the following command:

**`npu# show bearerqos`** `[<qos-alias>]`

Specify the QoS alias if you want to display configuration information for a particular bearer plane QoS marking rule. Do not specify a value for this parameter if you want to view configuration information for all bearer plane QoS marking rules.

**Command Syntax**

**`npu# show bearerqos`** `[<qos-alias>]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<qos-alias>]` | Denotes the QoS alias of the bearer QoS marking rule that you want to display.<br><br>Specify a value for this parameter if you want to display a specific bearer QoS marking rule. Do not specify a value for this parameter if you want to display all bearer QoS marking rules. | Optional | N/A | String |

**Display Format**

```
Bearer QoS Configuration :

qos-alias  intf-type srvc-type trfc-priority media-type inner-dscp
outer-dscp vlan-priority status

voip     <value>  <value>  <value>   <value>   <value>   <value>   enabled
```

**Command Modes**

Global command mode

## 4.3.10.12 Managing Service Interfaces

The service interface defines the interface provided by the NPU on the network. This interface contains information about the IP interface of the machine, the type of Reference Point (R3/R4/R6), and additional information (such as the default router to be used for the R3 interface in the no-HA mode) for the interface.

**To configure one or more service interfaces:**

1. Assign a pre-configured IP interface to at service interface (refer to Section 4.3.10.12.1)
2. You can now execute any of the following tasks:
   - » Configure the parameters for this service interface (refer to Section 4.3.10.12.2)

» Restore the default parameters for this service interface (refer to Section 4.3.10.12.3)

3 Terminate the service interface configuration mode (refer to Section 4.3.10.12.4)

In addition, you can, at any time, display configuration information (refer to Section 4.3.10.12.6) or delete an existing service interface (refer to Section 4.3.10.12.5).

The following example illustrates the (sequence of) commands for enabling the service interface configuration mode, configuring the service interface parameters, and then terminating the service interface:

```
npu(config)# srvc-intf 10.2.2.15

npu(config-srvcif)# config "R3 Interface Router" R3 tun-srcaddr
10.2.2.15 tun-dstaddr 10.2.2.1 tun-mtu 65535 tun-chksm

npu(config-srvcif)# exit
```

### 4.3.10.12.1 Assigning an IP Interface to a Service Interface

Run the following command to assign a pre-configured IP interface to a service interface. When you execute this command, the configuration mode for this service interface is automatically enabled.

```
npu(config)# srvc-intf <ip-intf>
```

**NOTE**

You can display configuration information for the service interface. For details, refer to Section 4.3.10.12.6.

**IMPORTANT**

An error may occur if you provide an invalid value for this parameter. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

After you run this command and the service interface configuration mode is enabled, you can configure the service interface parameters. For details, refer to “Configuring Parameters for the Service Interface” on page 287.

After assigning an IP interface to the service interface, you can execute any of the following tasks:

- Configure the parameters for this service interface (refer to Section 4.3.10.12.2)

- Restore the default parameters for this service interface (refer to Section 4.3.10.12.3)

After executing these tasks, you can terminate the service interface configuration mode (Section 4.3.10.12.4), and return to the global configuration mode.

**Command Syntax**

```
npu(config)# srvc-intf <ip-intf>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ip-intf> | Denotes the pre-configured IP interface that is to be assigned to the service interface. If you want to create a new service interface, specify the IP address of the service interface.<br><br>**Note**: If you are modifying the service interface, save the current configuration (refer Section 4.3.4.1) and reset the NPU (Section 4.2.2.1) for the change to take effect. | Mandatory | N/A | bearer |

**Command Modes**

Global configuration mode

### 4.3.10.12.2 Configuring Parameters for the Service Interface

After enabling the service interface configuration mode, run the following command to configure the parameters for this service interface:

```
npu(config-srvcif)# config [descr <string>] [intf-type <type>]
[tun-srcaddr <ip4addr>] [tun-dstaddr <ipv4addr>] [tun-mtu <size>]
[tun-chksm]
```

**NOTE**

You can display configuration information for the service interface. For details, refer Section 4.3.10.12.6.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-srvcif)# config [descr <string>] [intf-type <type>]
[tun-srcaddr <ip4addr>] [tun-dstaddr <ipv4addr>] [tun-mtu <size>]
[tun-chksm]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| config [descr <string>] | Contains a description of the service interface that is being configured for the NPU. | Optional | N/A | String |
| [intf-type <type>] | Denotes the type of service interface. | Optional | N/A | ■ 1: Indicates the R3 interface<br>■ 2: Indicates the R4<br>■ 3: Indicates the R6 interface<br>■ 4: Indicates the R8 interface |
| [tun-srcaddr <ip4addr>] | Denotes the source IPv4 address that indicates the point of origination of the tunnel for the service interface. | Optional | N/A | Valid IP Address |

| | | | | |
|---|---|---|---|---|
| [tun-dstaddr <ipv4addr>] | Denotes the destination IPv4 address that indicates the point of termination of the tunnel for the service interface. | Optional | N/A | Valid IP Address |
| [tun-mtu <size>] | Denotes the MTU. | Optional | 1480 | 556-1804 |
| [tun-chksm] | Indicates that the tunnel checksum feature is enabled. | Optional | By default, this feature is disabled. | The presence/absence of this flag indicates that this feature is enabled/ disabled. |

**Command Modes** Service interface configuration mode

### 4.3.10.12.3 Restoring the Default Configuration Parameters for the Service Interface

Run the following command to restore the default configuration for this service interface:

```
npu(config-srvcif)# no [tun-mtu] [tun-chksm]
```

**NOTE**

Refer to Section 4.3.10.12.2 for a description and default values of these parameters.

**Command Syntax** `npu(config-srvcif)# no [tun-mtu] [tun-chksm]`

**Privilege Level** 10

**Command Modes** Service interface configuration mode

### 4.3.10.12.4 Terminating the Service Interface Configuration Mode

Run the following command to terminate the service interface configuration mode:

```
npu(config-srvcif)# exit
```

| | |
|---|---|
| **Command Syntax** | **`npu(config-srvcif)# exit`** |
| **Privilege Level** | 10 |
| **Command Modes** | Service interface configuration mode |

### 4.3.10.12.5 Deleting Service Interfaces

You can, at any time, run the following command to delete service interface:

**`npu(config)# no srvc-intf`** `[<ip-intf>]`

**CAUTION**

Specify the value of the `ip-intf` parameter if you want to delete a specific service interface. Otherwise all the configured service interfaces are deleted.

| | |
|---|---|
| **Command Syntax** | **`npu(config)# no srvc-intf`** `[<ip-intf>]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<ip-intf>]` | Denotes the IP interface for which the service interface is to be deleted.<br><br>Specify a value for this parameter if you want to delete a specific service interface, otherwise all configured service interfaces are deleted. | Optional | N/A | String |

**Command Modes** Global configuration mode

### 4.3.10.12.6 Displaying Configuration Information for the Service Interface

To display one or all service interfaces, run the following command:

**npu# show srvc-intf** [<ip-intf>]

Specify a value for the `ip-intf` parameter if you want to display configuration information for a particular service interface. Do not specify a value for this parameter if you want to view configuration information for all service interfaces.

**Command Syntax** **npu# show srvc-intf** [<ip-intf>]

**Privilege Level** 1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<ip-intf>] | Denotes the IP address of the interface that you want to display. If you do not specify a value for this parameter, all the services interfaces that ar configured, are displayed. | Optional | N/A | Valid IP Address |

**Display Format**

```
Service Interface Configuration :

ip-intf descr intf-type tun-srcaddr tun-dstaddr tun-mtu  tun-chksm
<value> <value> <value>  <value>   <value>    <value> <value>
```

**Command Modes** Global command mode

## 4.3.10.13 Configuring the AAA Client Functionality

The AAA client functionality enables configuration of one RADIUS client. The RADIUS client encapsulates the messages destined for the AAA server in RADIUS messages or decapsulates messages sent by the AAA server for the MS.

The RADIUS client can be assigned an independent self address, primary AAA server address, alternate AAA server address, shared secret, and protocol port.

In addition, you can also configure certain RADIUS parameters such as the NAS ID and the time zone offset that are applicable for all AAA clients.

This section describes the commands for:


- "Managing AAA Client Configuration" on page 292
- "Managing Global RADIUS Configuration Parameters" on page 298


### 4.3.10.13.1 Managing AAA Client Configuration

**To configure one or more AAA clients:**

1. Enable the AAA client configuration mode (`refer` to Section 4.3.10.13.1.1)
2. You can now execute any of the following tasks:
   - » Configure the AAA client parameters (refer to Section 4.3.10.13.1.2)
   - » Restore the default parameters for the AAA client (refer to Section 4.3.10.13.1.3)
3. Terminate the AAA client configuration mode (refer to Section 4.3.10.13.1.4)

In addition, you can, at any time, display configuration information (refer to Section 4.3.10.13.1.6)or delete an existing AAA client (refer to Section 4.3.10.13.1.5).

The following example illustrates the (sequence of) commands for enabling the AAA client configuration mode, configuring the parameters of the AAA client, and then terminating the AAA client configuration mode:

```
npu(config)# aaa-client wimax

npu(config-aaa)# config src-intf eth0 primary-serveraddr
172.16.104.61 auth-port 5678

npu(config-aaa)# exit
```

#### 4.3.10.13.1.1 Enabling the AAA Client Configuration Mode\ Creating a New AAA Client

To configure the AAA client parameters, first enable the AAA client configuration mode. Run the following command to enable the AAA client configuration mode. You can also use this command to create a new AAA client configuration mode.

**npu(config)# aaa-client** <client-alias>

If you use this command to create a new AAA client, the configuration mode for this AAA client is automatically enabled, after which you can execute any of the following tasks:

- Configure the AAA client parameters (refer to Section 4.3.10.13.1.2)
- Restore the default parameters for the AAA client (refer to Section 4.3.10.13.1.3)

After executing these tasks, you can terminate the AAA client configuration mode and return to the global configuration mode (refer to Section 4.3.10.13.1.4).

**Command Syntax**

**npu(config)# aaa-client** <client-alias>

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <client-alias> | Denotes the client-alias of the AAA client for which the configuration mode is to be enabled.<br>If you want to create a new AAA client, specify the client-alias for the AAA client that you want to create. | Mandatory | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.13.1.2Configuring Parameters for the AAA Client

After enabling the AAA client configuration mode, run the following command to configure the parameters for the AAA client:

```
npu(config-aaa)# config [src-intf <ip-intf>] [primary-serveraddr
<ipv4addr>] [alternate-serveraddr <ipv4addr>] [rad-sharedsecret
<string>] [auth-port <port>] [acct-port <port>]
```

**NOTE**

You can display configuration information for a specific or all AAA clients. For details, refer to Section 4.3.10.13.1.6.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-aaa)# config [src-intf <ip-intf>] [primary-serveraddr
<ipv4addr>] [alternate-serveraddr <ipv4addr>] [rad-sharedsecret <string>]
[auth-port <port>] [acct-port <port>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [src-intf <ip-intf>] | Indicates the NPU interface for which the AAA server is providing RADIUS client functionality.<br>**Note**: If you are modifying the service interface for the AAA client, save the current configuration (refer Section 4.3.4.1) and reset the NPU (Section 4.2.2.1) for the change to take effect. | Optional | N/A | bearer |
| [primary-serveraddr <ipv4addr>] | Denotes IPv4 address of the primary AAA server. It is mandatory to specify a value for this parameter if you do not configure an alternate server. | Optional | 0.0.0.0 | Valid IP Address |

| | | | | |
|---|---|---|---|---|
| [alternate-serveraddr <ipv4addr>] | Denotes IPv4 address of the alternate AAA server.<br>It is mandatory to specify a value for this parameter if you do not configure a primary server. | Optional | N/A | Valid IP Address |
| [rad-sharedsecret <string>] | Denotes the shared secret between the authenticator function and the AAA server. | Optional | N/A | String |
| [auth-port <port>] | Denotes the Authenticator port on which the NPU listens and sends RADIUS messages. | Optional | 1812 | 1000-65535 |
| [acct-port <port>] | Denotes the accounting port on which the AAA client can listen and send RADIUS accounting messages. | Optional | 1813 | 0-65535 |

**Command Modes** AAA client configuration mode

### 4.3.10.13.1.3 Restoring the Default Configuration Parameters for the Authentication Port

Run the following command to restore the default configuration for the authentication port.

**npu(config-aaa)# no [primary-serveraddr] [alternate-serveraddr] [auth-port] [acct-port** <port>]

When you execute this command for restoring the default values, it also deletes the current values for the primary-server and alternate-server address.

**NOTE**

Refer to Section 4.3.10.2.1 for a description and default values of these parameters.

**Command Syntax** **npu(config-aaa)# no [primary-serveraddr] [alternate-serveraddr] [auth-port] [acct-port** <port>]

**Privilege Level** 10

| | |
|---|---|
| **Command Modes** | AAA client configuration mode |

### 4.3.10.13.1.4Terminating the AAA Client Configuration Mode

Run the following command to terminate the AAA client configuration mode:

```
npu(config-aaa)# exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-aaa)# exit` |
| **Privilege Level** | 10 |
| **Command Modes** | AAA client configuration mode |

### 4.3.10.13.1.5Deleting the AAA Client

Run the following command to delete the AAA client:

```
npu(config)# no aaa-client [<client-alias>]
```

**CAUTION**

Specify the AAA client alias if you want to delete a specific AAA client. Otherwise all the configured AAA clients are deleted.

In the current release, only one AAA client can be configured.

| | |
|---|---|
| **Command Syntax** | `npu(config)# no aaa-client [<client-alias>]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<client-alias>] | Denotes the AAA client that is to be deleted. If you do not specify a value for this parameter, all the existing AAA clients, are deleted. | Optional | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.13.1.6Displaying Configuration Information for the AAA Client

To display one or all AAA clients, run the following command:

**npu# show aaa-client** [<client-alias>]

Specify the AAA client alias if you want to display configuration information for a particular AAA client. Do not specify a value for this parameter if you want to view configuration information for all AAA clients.

**Command Syntax**

**npu# show aaa-client** [<client-alias>]

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<client-alias>]` | Denotes the client-alias for which the associated AAA client information is to be displayed.<br>Specify a value for this parameter if you want to display information about a specific AAA client.<br>If you want to display information about all AAA clients, do not specify any value for this parameter. | Optional | N/A | String |

**Display Format**

```
AAA Client Configuration :

client-alias src-intf primary-servweraddr alternate-serveraddr
rad-sharedsecret auth-port acct-port

<value>   <value>  <value>       <value>          <value>       <value>
```

**Command Modes**

Global command mode

### 4.3.10.13.2 Managing Global RADIUS Configuration Parameters

Global RADIUS configuration parameters for AAA clients determine how AAA clients should send access requests. This section describes the commands to be used for:

- “Configuring Global RADIUS Parameters” on page 298
- “Restoring the Default Global RADIUS Configuration Parameters” on page 300
- “Displaying Global RADIUS Configuration Parameters” on page 300

#### 4.3.10.13.2.1 Configuring Global RADIUS Parameters

To configure the global RADIUS configuration parameters to be used for all AAA clients, run the following command:

```
npu(config)# radius [accessreq-retries <retransmissions>]
[accessreq-interval <timeout>] [nasid <nas-identifier>]
[timezone-offset <time-offset>] [mtu <framed mtu size>]
```

**NOTE**

You can display configuration information for global RADIUS parameters. For details, refer to Section 4.3.10.13.2.3

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config)# radius [accessreq-retries <retransmissions>]
[accessreq-interval <timeout>] [nasid <nas-identifier>] [timezone-offset
<time-offset>] [mtu <framed mtu size>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [accessreq-retries <retransmissions>] | Denotes the maximum number of times the AAA client can resend the access request. | Optional | 3 | 0-5 |
| [accessreq-interval <timeout>] | Denotes the interval, in seconds, after which the AAA client can resend the access request. | Optional | 500 | 10-100000 |
| [nasid <nas-identifier>] | Denotes the unique identifier of the NAS. | Optional | N/A | String |
| [timezone-offset <time-offset>] | Denotes the time zone offset, in seconds, from GMT at the NAS. | Optional | 0 | 0-86400 |
| [mtu <framed mtu size>] | Denotes the MTU to be used for the AAA client functionality. | Optional | 1480 | 556 - 1804 |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

### 4.3.10.13.2.2Restoring the Default Global RADIUS Configuration Parameters

To restore the default global RADIUS configuration used for AAA clients, run the following command:

```
npu(config)# no radius [accessreq-retries] [accessreq-interval]
[nasid] [timezone-offset] [mtu]
```

**NOTE**

Refer Section 4.3.10.13.2.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config)# no radius [accessreq-retries] [accessreq-interval] [nasid] [timezone-offset] [mtu]` |
| **Privilege Level** | 10 |
| **Command Modes** | Global configuration mode |

### 4.3.10.13.2.3Displaying Global RADIUS Configuration Parameters

To display global RADIUS configuration parameters used for all AAA clients, run the following command:

```
npu# show radius
```

| | |
|---|---|
| **Command Syntax** | `npu# show radius` |
| **Privilege Level** | 1 |

| | |
|---|---|
| **Display Format** | `Radius Configuration :`<br>`accessreq-retries = <value>`<br>`accessreq-interval = <value>`<br>`nasid = <value>`<br>`timezone-offset = <value>`<br>`mtu = <value>` |
| **Command Modes** | Global command mode |

## 4.3.10.14 Managing Service Groups

A service group is a group of MSs that are part of the same service provider or same service class. You can configure only one service group, which is:

- Associated with a separate service interface.
- Configured as any one of the following:
  - DHCP server that allocates an IP address to the MS from the local pool (in the non-HA mode).
  - DHCP relay that obtains the IP address using an external DHCP server (in the non-HA mode).
  - DHCP proxy for either of the following boot modes:
    - Non-HA mode: The DHCP proxy assigns the MS, the IP address that was received from AAA in the MS profile or
    - HA mode: The DHCP proxy assigns the MS, the IP address received in the MS profile or obtains the IP address from HA using the mobile IP

**To configure a service group:**

1. Enable the service group configuration mode (refer to Section 4.3.10.14.1)
2. You can now execute any of the following tasks:

- Configure the common parameters of a service group (refer to Section 4.3.10.14.2)
- Enable the service group operation mode and configure the DHCP server/proxy/relay-specific parameters (refer to Section 4.3.10.14.3.1)

3 Terminate the service group configuration mode (refer to Section 4.3.10.14.5)

In addition, you can, at any time, display configuration information (refer to Section 4.3.10.15.3)or delete an existing service group (refer to Section 4.3.10.14.6).

The following example illustrates the (sequence of) commands for enabling the service group configuration mode, configuring common parameters of a service group, enabling the service group operation mode, configuring DHCP server configuration parameters for this group, and then terminating the service group configuration mode:

```
npu(config)# srvc-grp group-1

npu(config-srvcgrp)# config srvcif-alias eth0 waitdhcp-holdtime 5
dhcp-ownaddr 12345678

npu(config-srvcgrp)# dhcp-server

npu(config-srvcgrp-dhcpserver)# config pool-minaddr 10.10.10.1
pool-maxaddr 10.10.10.100 pool-subnet 255.255.255.0 dflt-gwaddr
10.10.10.200 lease-interval 100 renew-interval 50 rebind-interval
85 dnssrvr-addr 11.11.11.1

npu(config-srvcgrp)# exit
```

#### 4.3.10.14.1 Enabling the Service Group Configuration Mode\ Creating a New Service Group

To configure the parameters for the service group, first enable the service group configuration mode. Run the following command to enable the service group configuration mode or create the service group.

```
npu(config)# srvc-grp <grp-alias>
```

If you use this command to create a new service group, the configuration mode for this group is automatically enabled after which you can configure or restore the default parameters for this service group.

After enabling the service group configuration mode, you can execute any of the following tasks:

- Configure the common parameters for the service group (refer to Section 4.3.10.14.2)
- Enable the service group operation mode and configure the DHCP server/proxy/relay-specific parameters (refer to Section 4.3.10.14.3.1)

After executing these tasks, you can terminate the service group configuration mode (refer to Section 4.3.10.14.5).

**NOTE**

You can display configuration information for specific or all service groups. For details, refer to Section 4.3.10.15.3.

**Command Syntax**

```
npu(config)# srvc-grp <grp-alias>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <grp-alias> | Denotes the group-alias of the service group for which the service group configuration mode is to be enabled. If you want to create a new service group, specify the group alias to be assigned to the srevice group. | Mandatory | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.14.2 Configuring Common Parameters of a Service Group

After enabling the service group configuration mode, run the following command to configure common parameters for the service group:

```
npu(config-srvcgrp)# config [srvcif-alias <service interface>]
[waitdhcp-holdtime <timeout>] [dhcp-ownaddr <ipv4addr>]
```

**NOTE**

You can display configuration information for the service group. For details, refer to Section 4.3.10.15.3.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

**npu(config-srvcgrp)# config** {[**srvcif-alias** <service interface>] [**waitdhcp-holdtime** <timeout>] [**dhcp-ownaddr** <ipv4addr>]}

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [srvcif-alias <service interface>] | Denotes the pre-defined service interface alias to be used as the data path for traffic towards the core network. | Mandatory | N/A | String |
| [waitdhcp-holdtime <timeout>] | Denotes the period, in seconds, for which the NPU waits for an IP address allocation trigger (MIP registration request / DHCP discover) from the MS.<br>If you specify the value of this parameter as 0, no timer is started and the NPU will wait infinitely for the IP address allocation trigger. | Optional | 0 | 0-86400 |
| [dhcp-ownaddr <ipv4addr>] | Denotes the IPv4 address of the DHCP server/ relay/ proxy. | Mandatory | N/A | Valid IP Address |

**Command Modes**

Service group configuration mode

### 4.3.10.14.3 Configuring the DHCP Server/Proxy/Relay

**To configure the DHCP server/proxy/relay:**

1. Enable the service group operation mode for DHCP server/relay/proxy (refer to Section 4.3.10.14.3.1)
2. You can now execute any of the following tasks:
   - Configure the DHCP server (refer to Section 4.3.10.14.3.2)
   - Configure the DHCP proxy (refer to Section 4.3.10.14.3.3)
   - Configure the DHCP relay (refer to Section 4.3.10.14.3.4)

#### 4.3.10.14.3.1 Enabling the Service Group Operation Mode for DHCP Server//Proxy/Relay

Run the following command enable the DHCP (server/relay/proxy) configuration mode.

```
npu(config-srvcgrp)# {dhcp-server|dhcp-proxy|dhcp-relay}
```

When you run this command, the DHCP server/proxy/relay configuration mode is enabled, after which you can execute the following tasks:

- Configure the DHCP server (refer to Section 4.3.10.14.3.2)
- Configure the DHCP proxy (refer to Section 4.3.10.14.3.3)
- Configure the DHCP relay (refer to Section 4.3.10.14.3.4)

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcgrp)# {dhcp-server\|dhcp-proxy\|dhcp-relay}` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{dhcp-server\|dhcp-proxy\|dhcp-relay}` | Indicates whether the service group operation mode is to be enabled for the DHCP server, proxy or relay. | Mandatory | N/A | ■ dhcp-server<br>■ dhcp-proxy<br>■ dhcp-relay |

**Command Modes** Service group configuration mode

### 4.3.10.14.3.2Configuring the DHCP Server

After enabling the service group operation mode for the DHCP server, you can execute any of the following tasks:

- "Configuring DHCP Server Parameters" on page 306
- "Restoring Configuration Parameters for the DHCP Server" on page 308
- "Configuring Exclude IP Addresses for the DHCP Server" on page 308
- "Deleting Exclude IP Addresses for the DHCP Server" on page 309

**NOTE**

Before executing these tasks, ensure that you have enabled the DHCP server configuration mode. For details, refer to "Enabling the Service Group Operation Mode for DHCP Server//Proxy/Relay" on page 305.

#### *4.3.10.14.3.2.1Configuring DHCP Server Parameters*

Run the following command to configure the DHCP server:

```
npu(config-srvcgrp-dhcpserver)# config [pool-minaddr <ipv4addr>]
[pool-maxaddr <ipv4addr>] [pool-subnet <ipv4addr>] [dflt-gwaddr
<ipv4addr>] [lease-interval <timeout>] [renew-interval <percent>]
[rebind-interval <percent>] [dnssrvr-addr <ipv4addr>]
```

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

**npu(config-srvcgrp-dhcpserver)# config** [**pool-minaddr** <ipv4addr>] [**pool-maxaddr** <ipv4addr>] [**pool-subnet** <ipv4addr>] [**dflt-gwaddr** <ipv4addr>] [**lease-interval** <timeout>] [**renew-interval** <percent>] [**rebind-interval** <percent>] [**dnssrvr-addr** <ipv4addr>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [pool-minaddr <ipv4addr>] | Denotes the minimum IP address of the address pool configuration. | Mandatory | N/A | Valid IP Address |
| [pool-maxaddr <ipv4addr>] | Denotes the maximum IP address of the address pool configuration. | Mandatory | N/A | Valid IP Address |
| [pool-subnet <ipv4addr>] | Denotes the subnet IPv4 address of the address pool configuration. | Mandatory | 255.255.255.255 | 0.0.0.0 - 255.255.255.255 |
| [dflt-gwaddr <ipv4addr>] | Denotes the default IPv4 address of the NPU. | Optional | N/A | Valid IP Address |
| [lease-interval <timeout>] | Denotes the interval, in seconds, after which the MS should be deregistered | Optional | 86400 | 36 - 4294967295 |
| [renew-interval <percent>] | Denotes the period, after which, the MS can request for renewal of the lease which has expired. Specify the value of this parameter as a percentage of the lease-interval parameter | Optional | 50 | 1-100 |
| [rebind-interval <percent>] | Denotes the rebind interval maintained as a percentage of the lease interval. This is passed to the MS (DHCP client). | Optional | 67 | 1-100 |
| [dnssrvr-addr <ipv4addr>] | Denotes the optional DNS IP address to be forwarded to the MS (DHCP client). | Optional | N/A | Valid IP Address |

| | |
|---|---|
| **Command Modes** | Service Group-DCHP server configuration mode |

### 4.3.10.14.3.2.2Restoring Configuration Parameters for the DHCP Server

Run the following command to restore the DHCP server configuration. This command can be used to delete the DNS server address configuration.

```
npu(config-srvcgrp-dhcpserver)# no [lease-interval]
[renew-interval] [rebind-interval] [dnssrvr-addr]
```

**NOTE**

Refer to Section 4.3.10.14.3.2.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcgrp-dhcpserver)# no [lease-interval] [renew-interval] [rebind-interval] [dnssrvr-addr]` |
| **Privilege Level** | 10 |
| **Command Modes** | Service group-DHCP server configuration mode |

### 4.3.10.14.3.2.3Configuring Exclude IP Addresses for the DHCP Server

Run the following command to configure exclude IP addresses for the DHCP server:

```
npu(config-srvcgrp-dhcpserver)# exclude-addr <no. of Addrs (1-9)>
<ipv4addr> [<ipv4addr>] ….
```

**IMPORTANT**

An error may occur if you provide an invalid IP address. Refer the syntax description for more information about the appropriate values and format for configuring this parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcgrp-dhcpserver)# exclude-addr <no. of Addrs (1-9)> <ipv4addr> [<ipv4addr>] ….` |

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ipv4addr> | Denotes the exclude IP address that will not be assigned to an MS by the DHCP server. | Mandatory | N/A | Valid IP address<br>(You should specify at least one value and upto five values for this parameter.) |

**Command Modes**

Service group-DCHP server configuration mode

### *4.3.10.14.3.2.4Deleting Exclude IP Addresses for the DHCP Server*

Run the following command to delete one or all exclude IP addresses for the DHCP server:

```
npu(config-srvcgrp-dhcpserver)# no exclude-addr [<ipv4addr>]
```

**CAUTION**

Specify the IP address alias if you want to delete a specific exclude IP address. Otherwise all the configured exclude IP addresses are deleted.

The deleted exclude IP addresses are no longer excluded when the DHCP server allocates the IP addresses. That is, the server may allocate these IP addresses to the MS.

**Command Syntax**

```
npu(config-srvcgrp-dhcpserver)# no exclude-addr [<ipv4addr>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ipv4addr> | Denotes the IP address that you want to remove from the list of exclude IP addresses. Specify a value for this parameter if you want to delete a specific exclude IP address. If you do not specify any IP address, it will remove all the exclude IP addresses that you have specified for that DHCP server. | Optional | N/A | Valid IP address |

**Command Modes** Service group-DHCP server configuration mode

### *4.3.10.14.3.2.5Terminating the DHCP Server Configuration Mode*

Run the following command to terminate the DHCP server configuration mode:

```
npu(config-srvcgrp-dhcpserver)# exit
```

**Command Syntax** `npu(config-srvcgrp-dhcpserver)# exit`

**Privilege Level** 10

**Command Modes** Service group-DHCP server configuration mode

### 4.3.10.14.3.3Configuring the DHCP Proxy

After enabling the service group operation mode for the DHCP proxy, you can execute the following tasks:

- “Specifying DHCP Proxy Configuration Parameters” on page 311
- “Restoring the Default Configuration Parameters for the DHCP Proxy” on page 312

■ “Terminating the DHCP Proxy Configuration Mode” on page 312

### 4.3.10.14.3.3.1Specifying DHCP Proxy Configuration Parameters

Run the following command to configure the DHCP proxy:

**npu(config-srvcgrp-dhcpproxy)# config** [**offerreuse-holdtime** <timeout>] [**lease-interval** <timeout>] [**dnssrvr-addr** <ipv4addr>]

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

**npu(config-srvcgrp-dhcpproxy)# config** [**offerreuse-holdtime** <timeout>] [**lease-interval** <timeout>] [**dnssrvr-addr** <ipv4addr>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [offerreuse-holdtime <timeout>] | Denotes the duration within which the MS should send a DHCP request to accept the address sent by the NPU.<br>If the MS does not accept the address within this period, the MS is deregistered. | Optional | 5 | 0-120 |
| [lease-interval <timeout>] | Denotes the lease interval, in seconds, after which the MS is deregistered | Optional | 24 * 3600 | 36 - 4294967295 |
| [dnssrvr-addr <ipv4addr>] | Denotes the IP address of the optional DNS. This address is forwarded to the MS (DHCP client) | Optional | N/A | Valid IP Address |

**Command Modes**

Service group-DHCP proxy configuration mode

### 4.3.10.14.3.3.2Restoring the Default Configuration Parameters for the DHCP Proxy

Run the following command to restore the default configuration for the DHCP proxy (`offerreuse-holdtime` and `lease-interval` parameters). This command can also be used to delete the configured DNS server address (if specified).

```
npu(config-srvcgrp-dhcpproxy)# no [offerreuse-holdtime]
[lease-interval] [dnssrvr-addr]
```

**NOTE**

Refer Section 4.3.10.14.3.3.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcgrp-dhcpproxy)# no [offerreuse-holdtime] [lease-interval] [dnssrvr-addr]` |
| **Privilege Level** | 10 |
| **Command Modes** | Service group-DHCP proxy configuration mode |

### 4.3.10.14.3.3.3Terminating the DHCP Proxy Configuration Mode

Run the following command to terminate the DHCP proxy configuration mode:

```
npu(config-srvcgrp-dhcpproxy)# exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcgrp-dhcpproxy)# exit` |
| **Privilege Level** | 10 |
| **Command Modes** | Service group-DHCP proxy configuration mode |

### 4.3.10.14.3.4Configuring the DHCP Relay

After enabling the service group operation mode for the DHCP relay, you can execute any of the following tasks:

- "Configuring the DHCP Relay Parameters" on page 313
- "Terminating the DHCP Relay Configuration Mode" on page 313


### 4.3.10.14.3.4.1 Configuring the DHCP Relay Parameters

Run the following command to configure the DHCP server address for the DHCP relay:

```
npu(config-srvcgrp-dhcprelay)# config server-addr <ipv4addr>
```

**IMPORTANT**

An error may occur if you provide an invalid value for the DHCP server address. Refer the syntax description for more information about the appropriate values and format for configuring this parameters.

**Command Syntax**

```
npu(config-srvcgrp-dhcprelay)# config server-addr <ipv4addr>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[server-addr <ipv4addr>]` | Denotes the DHCP server address that is being configured. | Mandatory | N/A | Valid IP Address |

**Command Modes**

Service group-DHCP relay configuration mode

### 4.3.10.14.3.4.2 Terminating the DHCP Relay Configuration Mode

Run the following command to terminate the DHCP relay configuration mode for this service group:

```
npu(config-srvcgrp-dhcprelay)# exit
```

**Command Syntax**

```
npu(config-srvcgrp-dhcprelay)# exit
```

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | Service group-DHCP relay configuration mode |

### 4.3.10.14.4 Restoring the Default Configuration for the Service Group

Run the following command to restore the default configuration for this service group:

```
npu(config-srvcgrp)# no [waitdhcp-holdtime]
```

**NOTE**

Refer to Section 4.3.10.14.4 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcgrp)# no [waitdhcp-holdtime]` |

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | Service group configuration mode |

### 4.3.10.14.5 Terminating the Service Group Configuration Mode

Run the following command to terminate the service group configuration mode:

```
npu(config-srvcgrp)# exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcgrp)# exit` |

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | Service group configuration mode |

### 4.3.10.14.6 Deleting the Service Group

You can, at any time, run the following command to delete a service group:

```
npu(config)# no srvc-grp [<grp-alias>]
```

**CAUTION**

Specify the service group alias if you want to delete a specific service group.

**Command Syntax**

```
npu(config)# no srvc-grp [<grp-alias>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<grp-alias>] | Denotes the group-alias for which the service group to be deleted. | Optional | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.14.7 Displaying Configuration Information for the Service Group

To display configuration information for a service group, run the following command:

```
npu# show srvc-grp [<grp-alias>]
```

**Command Syntax**

```
npu# show srvc-grp [<grp-alias>]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<grp-alias>] | Denotes the group-alias for which the service group to be displayed. | Optional | N/A | String |

**Display Format**

```
Service Group Configuration :
grp-alias = <value>
srvcif-alias = <value>
waitdhcp-holdtime = <value>
dhcp-ownaddr = <value>
dhcp-mode = <value>
{server-addr = <value>} (for relay)
{offerreuse-holdtime = <value>
lease-interval = <value>
dnssrvr-addr = <value>} (for proxy)
{pool-minaddr = <value>
pool-maxaddr = <value>
pool-subnet = <value>
dflt-gwaddr = <value>
lease-interval = <value>
renew-interval = <value>
rebind-interval = <value>
dnssrvr-addr = <value>
exclude-addrlist = <value> <value> ...} (for server)
```

## 4.3.10.15 Configuring the Service Flow Authorization Functionality

The Service Flow Authorization (SFA) functionality handles creation/ maintenance of pre-provisioned service flows for MS. It maps the AAA parameters (service profile name) received from the AAA server to pre-configured WiMAX-specific QoS parameters in the NPU. The SFA functionality enables you to

configure multiple service profiles with multiple service flows and classification rules.

This section describes the commands to be used for:


- "Configuring Parameters for the SFA Functionality" on page 317
- "Restoring the Default Configuration Parameters for the SFA Functionality" on page 318
- "Displaying Configuration Information for the SFA Functionality" on page 319
- "Configuring Service Profiles" on page 320
- "Configuring Classification Rules" on page 335


### 4.3.10.15.1 Configuring Parameters for the SFA Functionality

To configure the parameters for the SFA functionality, run the following command:

```
npu(config)# sfa [dflt-trafficpriority <value>] [dflt-cstype
<value>] [dflt-trafficpref <value>] [dflt-pagpref <value>]
[dflt-traffpagenable] [msdrop-missprofile <counter>]
```

**NOTE**

You can display configuration information for the SFA functionality. For details, refer Section 4.3.10.15.3.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config)# sfa [dflt-trafficpriority <value>] [dflt-cstype <value>] [dflt-trafficpref <value>] [dflt-pagpref <value>] [dflt-traffpagenable] [msdrop-missprofile <counter>]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[dflt-trafficpriority <value>]` | Denotes the system-wide default value for traffic priority. This value is used if the traffic priority field of the service profile is set to 0. | Optional | 0 | 0-7, where 7 is the highest. |
| `[dflt-cstype <value>]` | Denotes the system-wide default value for CS.<br>This value is used if the CS field of the service profile is set to 255. | Optional | 1 | 1 indicates IPv4CS. (the current release supports only IPv4CS) |
| `[dflt-trafficpref <value>]` | Denotes the system-wide default value for traffic preference.<br>This value is used if the Traffic Preference field of the service profile is set to 0. | Optional | 0 | ■ 0: Indicates disable<br>■ 1: Indicates enable |
| `[dflt-pagpref <value>]` | Indicates that the use of the default values specified for the dflt-trafficpref and dflt-pagpref parameters is to be enabled. | Optional | 0 | ■ 0: Indicates disable<br>■ 1: Indicates enable |
| `[msdrop-missprofile <counter>]` | Denotes the threshold value for the MSs that were dropped because of missing profiles. An alarm is raised when this threshold is crossed. | Optional | 0 | 0 - 10000 |

**Command Modes**

Global configuration mode

### 4.3.10.15.2 Restoring the Default Configuration Parameters for the SFA Functionality

To restore the default configuration for the SFA functionality, run the following command:

```
npu(config)# no sfa [dflt-trafficpriority] [dflt-cstype]
[dflt-trafficpref] [dflt-pagpref] [dflt-enable]
[msdrop-missprofile]
```

**NOTE**

Refer to Section 4.3.10.15.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config)# no sfa [dflt-trafficpriority] [dflt-cstype] [dflt-trafficpref] [dflt-pagpref] [dflt-enable] [msdrop-missprofile]` |
| **Privilege Level** | 10 |
| **Command Modes** | Global configuration mode |

### 4.3.10.15.3 Displaying Configuration Information for the SFA Functionality

To display the current configuration information for the SFA functionality, run the following command:

```
npu# show sfa
```

| | |
|---|---|
| **Command Syntax** | `npu# show sfa` |
| **Privilege Level** | 1 |
| **Display Format** | `SFA Configuration :`<br>`dflt-trafficpriority = <value>`<br>`dflt-cstype = <value>`<br>`dflt-trafficpref = <value>`<br>`dflt-pagpref = <value>`<br>`dflt-trafficpagpref-status = <value>`<br>`msdrop-missprofile = <value>` |

| Command Modes | Global command mode |
|---|---|

### 4.3.10.15.4 Configuring Service Profiles

The NPU allows for guaranteed end-to-end QoS for user traffic across the ASN. The QoS approach is connection-oriented, whereby user traffic is classified into "service flows." A service flow is a unidirectional stream of packets, either in the downlink or uplink direction, associated with a certain set of QoS requirements such as maximum latency. The QoS requirements for service flows are derived from "service profiles" defined by the operator. A service profile is a set of attributes shared by a set of service flows. For instance, an operator might define a service profile called "Internet Gold" that will include QoS and other definitions to be applied to service flows associated with users subscribed to the operator's "Internet Gold" service package.

**To configure one or more service profiles:**

1. Enable the service profile configuration mode (refer to Section 4.3.10.15.4.1)
2. You can now execute any of the following tasks:
   - Configure the parameters for this service profile (refer to Section 4.3.10.15.4.2)
   - Manage service flow configuration for this service profile (refer to Section 4.3.10.15.4.3)
   - Delete service flows (refer to Section 4.3.10.15.4.3.7)
   - Disable service profiles (refer to Section 4.3.10.15.4.4)
3. Terminate the service profile configuration mode (refer to Section 4.3.10.15.4.5)

You can, at any time, display configuration information (refer to Section 4.3.10.15.4.6) or delete an existing service profile (refer to Section 4.3.10.15.4.7).

The following example illustrates the (sequence of) commands for enabling the service profile configuration mode, configuring the parameters of a service profile, and then disabling and terminating the service profile configuration mode:

```
npu(config)# srvc-profile prof_1
```

```
npu(config-srvcprfl)# config profile-enable srvc-grp grp_2

npu(config-srvcprfl)# no [profile-enable]

npu(config-srvcprfl)# exit
```

#### 4.3.10.15.4.1 Enabling the Service Profile Configuration Mode\Creating a New Service Profile

To configure the parameters for a service profile, first enable the service profile configuration mode. Run the following command to enable the service profile configuration mode. You can also use this command to create a new service profile.

```
npu(config)# srvc-profile <profile-name>
```

If you use this command to create a new service profile, the configuration mode for this rule is automatically enabled, after which you can execute any of the following tasks:

- Configure the parameters for this service profile (refer to Section 4.3.10.15.4.2)
- Manage service flow configuration for this service profile (refer to Section 4.3.10.15.4.3)
- Delete service flows (refer to Section 4.3.10.15.4.3.7)
- Disable service profiles (refer to Section 4.3.10.15.4.4)

After you have executed these tasks, terminate the service profile configuration mode (refer to Section 4.3.10.15.4.5) to return to the service group configuration mode.

| | |
|---|---|
| **Command Syntax** | `npu(config)# srvc-profile <profile-name>` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<profile-name>` | Denotes the name of the service profile for which the configuration mode is to be enabled.<br><br>If you are creating a new service profile, specify the name of the new service profile. The configuration mode is automatically enabled for the new service profile. | Mandatory | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.15.4.2 Specifying Service Profile Configuration Parameters

After enabling the service profile configuration mode, run the following command to configure the parameters for this service profile:

```
npu(config-srvcprfl)# config [profile-enable] [srvc-grp
<grp-alias>]
```

**NOTE**

You can display configuration information for specific or all service profiles. For details, refer to Section 4.3.10.15.4.6.

**Command Syntax**

```
npu(config-srvcprfl)# config [profile-enable] [srvc-grp <grp-alias>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[profile-enable]` | Indicates whether this service profile is active. If this service profile is not active, it cannot be used for QoS parameter mapping. The absence of this flag indicates that this service profile is inactive.<br>By default, this flag is disabled. | Mandatory | By default, this flag is disabled | The presence/absence of this flag indicates whether this service profile should is active/inactive |
| `[srvc-grp <grp-alias>]` | Denotes the service group alias with which this service profile is to be associated. | Optional | N/A | String |

**Command Modes** Service profile configuration mode

## 4.3.10.15.4.3Configuring Service Flows

Service flows are unidirectional stream of packets, either in the downlink or uplink direction, associated with a certain set of QoS requirements such as maximum latency and minimum rate. Based on certain classification rules, service flows are transported over the R1 air interface in 802.16e connections, identified by connection IDs, and identified by GRE keys over the R6 interface in GRE tunnels. In addition, the ASN-GW can mark outgoing traffic in the R3 interface for further QoS processing within the CSN.

**After enabling the service profile configuration mode, execute the following tasks to configure service flows within this service profile:**

1. Enable the service flow configuration mode (refer to Section 4.3.10.15.4.3.1)
2. You can now execute any of the following tasks:
   - Configure the parameters for this service flow (refer to Section 4.3.10.15.4.3.2)
   - Restore the default parameters for this service flow (refer to Section 4.3.10.15.4.3.3)

» Configure uplink/downlink classification rule names (refer to Section 4.3.10.15.4.3.4)

3 Terminate the service flow configuration mode (refer to Section 4.3.10.15.4.3.6)

You can, at any time delete an existing service flow (refer to Section 4.3.10.15.4.3.7).

The following example illustrates the (sequence of) commands for enabling the service flow configuration mode, configuring the parameters of a service flow, and then terminating the service flow configuration mode:

```
npu(config-srvcprfl)# flow 12

npu(config-srvcprfl-flow)# flow-type bidirectional cs-type 10
media-type voice traffic-pref 6 pag-pref 1 enable-pref
uldatadlvry-type 3 ulqos-maxsustainedrate 5000
ulqos-trafficpriority 6 dlqos-maxsustainedrate 2000

npu(config-srvcprfl-flow)# exit
```

### *4.3.10.15.4.3.1Enabling the Service Flow Configuration Mode\ Creating a New Service Flow*

To configure the parameters for a service flow, first enable the service flow configuration mode. Run the following command to enable the service flow configuration mode. You can also use this command to create a new service flow.

```
npu(config-srvcprfl)# flow <flow-id>
```

If you use this command to create a new service flow, the configuration mode for this service flow is automatically enabled, after which you can execute any of the following tasks:

- Configure the parameters for this service flow (refer to Section 4.3.10.15.4.3.2)
- Restore the default parameters for this service flow (refer to Section 4.3.10.15.4.3.3)
- Configure uplink/downlink classification rule names (refer to Section 4.3.10.15.4.3.4)

After you have executed these tasks, you can terminate the service flow configuration mode, and return to the service profile configuration mode (refer to Section 4.3.10.15.4.3.6).

**Command Syntax**

**npu(config-srvcprfl)# flow** <flow-id>

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <flow-id> | Denotes the flow ID of the service flow for which the service flow configuration mode is to be enabled. If you are creating a new service flow, specify the service flow ID of the new service flow. The configuration mode is automatically enabled for the new service flow. | Mandatory | N/A | 1-255 |

## *4.3.10.15.4.3.2Specifying Service Flow Configuration Parameters*

**Command Modes**

Service profile configuration mode

After enabling the service flow configuration mode, run the following command to configure the parameters for this service flow:

**npu(config-srvcprfl-flow)# config** [**flow-type** <type>] [**cs-type** <type>] [**media-type** <type>] [**traffic-pref** <value>] [**pag-pref** <value>] [**enable-pref**] [**uldatadlvry-type** <type>] [**ulqos-maxsustainedrate** <value>] [**ulqos-trafficpriority** <value>] [**dldatadlvry-type** <type>] [**dlqos-maxsustainedrate** <value>] [**dlqos-trafficpriority** <value>]

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-srvcprfl-flow)# config [flow-type <type>] [cs-type <type>]
[media-type <type>] [traffic-pref <value>] [pag-pref <value>]
[enable-pref] [uldatadlvry-type <type>] [ulqos-maxsustainedrate <value>]
[ulqos-trafficpriority <value>] [dldatadlvry-type <type>]
[dlqos-maxsustainedrate <value>] [dlqos-trafficpriority <value>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [flow-type <type>] | Denotes the type of flow, that is, bi-directional or multicast. | Optional | 1 | ■ 1: Indicates bi-directional<br>■ 2: Indicates multicast |
| [cs-type <type>] | Denotes the system-wide default value for CS type. This value is used if the CS type field of the service profile is set to 0. | Optional | 255 | ■ 1: Indicates IPv4CS. (The current release supports only IPv4CS)<br>■ 255: Indicates NONE |
| [media-type <type>] | Denotes the type of media carried by the service flow. | Optional | None | String |
| [traffic-pref <value>] | Denotes the preference to be applied for the traffic carried by the service flow. | Optional | 0 | ■ 0: Indicates disable<br>■ 1: Indicates enable |
| [pag-pref <value>] | Denotes the paging preference associated with the service flow.<br>**Note**: This feature is not supported in the current release. | Optional | 0 | ■ 0: Indicates disable<br>■ 1 Indicates enable |

| | | | | |
|---|---|---|---|---|
| [enable-pref] | Indicates that the use of the values specified for the traffic-pref and pag-pref parameters is to be enabled. | Optional | By default, this flag is disabled. | The presence/absence of this flag indicates that the traffic-pref and pag-pref parameters should be enabled/disabled. |
| [uldatadlvry-type <type>] | Denotes the data delivery type for uplink traffic carried by the service flow.<br>The current release supports only value 3 that indicates that Best Effort (BE) data delivery type is supported. | Optional | 3 | 0-4, where 3 indicates BE (only 3 is supported in this release) |
| [ulqos-maxsustainedrate <value>] | Denotes the maximum sustained traffic rate, in bps, for uplink traffic carried by the service flow. | Optional | 250 | 10-10000000 bps |
| [ulqos-traffic priority <value>] | Denotes the traffic priority to be applied to the uplink traffic carried by the service flow. | Optional | 0 | 0-7, where 0 is lowest and 7 is highest |
| [dldatadlvry-type <type>] | Denotes the data delivery type for the downlink traffic carried by the service flow.<br>The current release supports only value 3 that represents that Best Effort (BE) data delivery type is supported. | Optional | 3 | 0-4, where 3 indicates BE (only 3 is supported in this release) |
| [dlqos-maxsustainedrate <value>] | Denotes the maximum sustained traffic rate, in bps, for the downlink traffic carried by the service flow. | Optional | 250 | 10-10000000 bps |
| [dlqos-traffic priority <value>] | Denotes the 802.16e SF priority to be signalled to the BS. | Optional | 0 | 0-7, where 7 is highest |

| | |
|---|---|
| **Command Modes** | Service profile-service flow configuration mode |

### 4.3.10.15.4.3.3Restoring the Default Service Flow Configuration Parameters

Run the following command to restore the default configuration for this service flow:

```
npu(config-srvcprfl-flow)# no [cs-type] [media-type] [traffic-pref]
[pag-pref] [enable-pref] [uldatadlvry-type]
[ulqos-maxsustainedrate] [ulqos-trafficpriority]
[dldatadlvry-type] [dlqos-maxsustainedrate]
[dlqos-trafficpriority]
```

**NOTE**

Refer to Section 4.3.10.15.4.3.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcprfl-flow)# no [cs-type] [media-type] [traffic-pref] [pag-pref] [enable-pref] [uldatadlvry-type] [ulqos-maxsustainedrate] [ulqos-trafficpriority] [dldatadlvry-type] [dlqos-maxsustainedrate] [dlqos-trafficpriority]` |
| **Privilege Level** | 10 |
| **Command Modes** | Service profile-service flow configuration mode |

### 4.3.10.15.4.3.4Configuring Uplink/Downlink Classification Rule Names

After enabling the service flow configuration mode, run the following commands to configure uplink/downlink classification rules:

```
npu(config-srvcprfl-flow)# ulclsf-rulename <number of rules(1-9)>
<name1> [<name2>] [...]
```

```
npu(config-srvcprfl-flow)# dlclsf-rulename <number of rules(1-9)>
<name1> [<name2>] [...]
```

After you have executed these tasks, you can terminate the service flow configuration mode, and return to the service profile configuration mode

(Section 4.3.10.15.4.3.6). For more information about configuring classification rules, refer "Configuring Classification Rules" on page 335.

**Command Syntax**

**npu(config-srvcprfl-flow)# ulclsf-rulename** <number of rules(1-9)> <name1> [<name2>] [...]

**npu(config-srvcprfl-flow)# dlclsf-rulename** <number of rules(1-9)> <name1> [<name2>] [...]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <number of rules(1-9)> | Indicates the number of uplink classification rules to be created | Mandatory | N/A | 1-9 |
| <name1><br><name2><br><name3> | Indicates the name of the classification rule to be linked to this service flow. Use the classification rule name to reference the appropriate classification rule.<br>For more information about creating classification rules, refer to Section 4.3.10.15.5.1. | Mandatory | N/A | Valid classification rule name |

**Command Modes**

Service profile-service flow configuration mode

### 4.3.10.15.4.3.5Deleting Uplink/Downlink Classification Rule Names

After enabling the service flow configuration mode, run the following commands to delete uplink/downlink classification rules:

**npu(config-srvcprfl-flow)# no ulclsf-rulename** <number of rules(1-9)> <name1> [<name2>] [...]

**npu(config-srvcprfl-flow)# no dlclsf-rulename** <number of rules(1-9)> <name1> [<name2>] [...]

After you have executed these commands, you can terminate the service flow configuration mode, and return to the service profile configuration mode (refer to Section 4.3.10.15.4.3.6)

**Command Syntax**

```
npu(config-srvcprfl-flow)# no ulclsf-rulename <number of rules(1-9)>
<name1> [<name2>] [...]
```

```
npu(config-srvcprfl-flow)# no dlclsf-rulename <number of rules(1-9)>
<name1> [<name2>] [...]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <number of rules(1-9)> | Indicates the number of uplink classification rules to be deleted. | Mandatory | N/A | 1-9 |
| <name1><br><name2><br><name3> | Indicates the name of the classification rule to be deleted from to this service flow. Use the classification rule name to reference the appropriate classification rule.<br>For more information about creating classification rules, refer to Section 4.3.10.15.5.1. | Mandatory | N/A | Valid classification rule name |

**Command Modes**

Service profile-service flow configuration mode

### *4.3.10.15.4.3.6Terminating the Service Flow Configuration Mode*

Run the following command to terminate the service flow configuration mode:

```
npu(config-srvcprfl-flow)# exit
```

**Command Syntax**

```
npu(config-srvcprfl-flow)# exit
```

**Privilege Level** 10

**Command Modes** Service profile-service flow configuration mode

### 4.3.10.15.4.3.7Deleting Service Flows

You can, at any time, run the following command to delete one or all service flows:

**`npu(config-srvcprfl)# no flow`** `[<flow-id>]`

**CAUTION**

Specify the flow ID if you want to delete a specific service flow. Otherwise all the configured service flows are deleted.

**Command Syntax** **`npu(config-srvcprfl)# no flow`** `[<flow-id>]`

**Privilege Level** 10

**Command Syntax** **`npu(config-srvcprfl)# no flow`** `[<flow-id>]`

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<flow-id>]` | Denotes the flow ID of the service flow to be deleted.<br>If you do nort specify a value for this parameter, all the service flows are deleted. | Optional | N/A | 0-$2^{32}$ |

**Command Modes** Service profile configuration mode

### 4.3.10.15.4.4Disabling the Current Service Profile

Run the following command to disable a service profile. When you disable a service profile, configuration information for that service profile is retained in the system.

```
npu(config-srvcprfl)# no <profile-enable>
```

**IMPORTANT**

To enable a service profile that is currently disabled, run the following command:

```
npu(config-srvcprfl)# config [profile-enable] [srvc-grp <grp-alias>]
```

For details, refer to "Specifying Service Profile Configuration Parameters" on page 322.

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcprfl)# no <profile-enable>` |
| **Privilege Level** | 10 |
| **Command Modes** | Service profile configuration mode |

### 4.3.10.15.4.5Terminating the Service Profile Configuration Mode

Run the following command to terminate the service profile configuration mode:

```
npu(config-srvcprfl)# exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-srvcprfl)# exit` |
| **Privilege Level** | 10 |
| **Command Modes** | Service profile configuration mode |

### 4.3.10.15.4.6Displaying Configuration Information for Service Profiles

To display all or specific service profiles, run the following command:

```
npu# show srvc-profile [<profile-name>]
```

Specify the profile name if you want to display configuration information for a particular service profile. Do not specify a value for this parameter if you want to view configuration information for all service profile.

**IMPORTANT**

An error may occur if you provide an invalid service profile name. Refer the syntax description for more information about the appropriate values and format for configuring this parameter.

**Command Syntax**

```
npu# show srvc-profile [<profile-name>]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<profile-name>]` | Indicates the name of the service profile for which configuration information is to be displayed.<br><br>If you do not specify a value for this parameter, configuration information is displayed for all service profiles. | Optional | N/A | String |

**Display Format**

```
Service Profile Configuration :
srvc-profile = <value>
srvc-grp = <value>
status = <value>
{flow-id = <value>
flow-type = <value>
cs-type = <value>
media-type = <value>
traffic-pref = <value>
pag-pref = <value>
trafficpagpref-status = <value>
uldatadlvry-type = <value>
ulqos-maxsustainedrate = <value>
ulqos-trafficpriority = <value>
dldatadlvry-type = <value>
dlqos-maxsustainedrate = <value>
dlqos-trafficpriority = <value>
ulclsf-rulename = <value> <value> ...
dlclsf-rulename = <value> <value> ...}
{flow-id = <value> ........ }
```

**Command Modes**

Global configuration mode

### 4.3.10.15.4.7Deleting Service Profiles

Run the following command to delete one or all service profiles:

```
npu(config)# no srvc-profile [<profile-name>]
```

**CAUTION**

Specify the profile name if you want to delete a specific service profile. Otherwise all the configured service profiles are deleted.

**Command Syntax**

```
npu(config)# no srvc-profile [<profile-name>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<profile-name>] | Denotes the name of the service profile you want to delete. Specify this parameter only if you want to delete a specific service profile. | Optional | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.15.5 Configuring Classification Rules

Classification rules are user-configurable rules that are used to classify packets transmitted on the bearer plane. You can associate one or more classification rules with a particular service profile (For details, refer to Section 4.3.10.15.4.3.4).

You can define a classification rule with respect to the following criteria:

- IP ToS/DSCP
- IP protocol (such as UDP or TCP)
- IP source address (an address mask can be used to define a range of addresses or subnet)
- IP destination address (an address mask can be used to define a range of addresses or subnet)
- Source port range
- Destination port range

Classification rules can be specified for:

- Downlink data is classified by the ASN-GW into GRE tunnels, which, in turn, are mapped into 802.16e connections in the air interface

- Uplink data is classified by the MS into 802.16e connections, and with respect to classification rules defined in the service profile provisioned in the ASN-GW and downloaded to the MS when establishing a connection.

For instance, you can define a downlink classification rule that will classify traffic to a certain MS with a DSCP value of 46 into a UGS connection, and all other traffic to the MS into a best effort connection. In addition, an uplink classification rule can be defined that will classify traffic from this MS with a UDP destination port higher than 5000 into a UGS connection, and all other traffic from the MS into a best effort connection.

**To configure one or more classification rules:**

1. Enable the classification rules configuration mode (refer to Section 4.3.10.15.5.1)
2. You can now execute any of the following tasks:
   - Configure the parameters for this classification rule (refer to Section 4.3.10.15.5.2)
   - Restore the default parameters for this classification rule (refer to Section 4.3.10.15.5.3)
   - Manage protocol configuration (refer to Section 4.3.10.15.5.4)
   - Manage source address configuration (seeSection 4.3.10.15.5.5)
   - Manage destination address configuration (refer to Section 4.3.10.15.5.6)
   - Manage source port configuration (refer to Section 4.3.10.15.5.7)
   - Manage destination port configuration (refer to Section 4.3.10.15.5.8)
3. Terminate the classification rules configuration mode (refer to Section 4.3.10.15.5.9)

You can, at any time, display configuration information (refer to Section 4.3.10.15.5.10) or delete an existing classification rule (refer to Section 4.3.10.15.5.11), protocol lists (refer to Section 4.3.10.15.5.4.5), source addresses (refer to Section 4.3.10.15.5.5.5), destination addresses (refer to

Section 4.3.10.15.5.6.5), source ports (refer to Section 4.3.10.15.5.7.5), or destination ports (refer to Section 4.3.10.15.5.8.5) configured for this classification rule.

The following example illustrates the (sequence of) commands for enabling the classification rules configuration mode, configuring the parameters of a classification rule, and then terminating the classification configuration mode:

```
npu(config)# clsf-rule classf_rule1

npu(config-clsfrule)# config priority 20 phs-rulename PHS_1
iptos-low 2 iptos-high 5 iptos-enable

npu(config-clsfrule)# exit
```

### 4.3.10.15.5.1 Enabling the Classification Rule Configuration Mode\ Creating a New Classification Rule

To configure the parameters for a classification rule, first enable the classification rule configuration mode. Run the following command to enable the classification rule configuration mode. You can also use this command to create a new classification rule.

```
npu(config)# clsf-rule <rulename>
```

If you use this command to create a new classification rule, the configuration mode for this rule is automatically enabled, after which you can execute any of the following tasks:

- Configure the parameters for this classification rule (refer to Section 4.3.10.15.5.2).
- Restore the default parameters for this classification rule (refer to Section 4.3.10.15.5.3)
- Manage protocol configuration (refer to Section 4.3.10.15.5.4)
- Manage source address configuration (refer to Section 4.3.10.15.5.5)
- Manage destination address configuration (refer to Section 4.3.10.15.5.6)
- Manage source port configuration (refer to Section 4.3.10.15.5.7)
- Manage destination port configuration (refer to Section 4.3.10.15.5.8)

After you have executed these tasks, you can terminate the classification rules configuration mode (refer to Section 4.3.10.15.5.9).

**Command Syntax**

```
npu(config)# clsf-rule <rulename>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <rulename> | Denotes the name of the classification rule for which the configuration mode is to be enabled. If you want to create a new classification rule, specify the rule name for the new classification rule. The classification rule configuration mode will automatically be enabled for the new rule. | Mandatory | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.15.5.2 Specifying Configuration Parameters for the Classification Rule

After enabling the classification rules configuration mode, run the following command to configure the parameters for this classification rule:

```
npu(config-clsfrule)# config [priority <priority>] [phs-rulename
<rulename>] [iptos-low <value>] [iptos-high <value>] [iptos-mask
<value>] [iptos-enable]
```

**NOTE**

You can display configuration information for specific or all classification rules. For details, refer to Section 4.3.10.15.5.10.

**Command Syntax**

```
npu(config-clsfrule)# config [priority <priority>] [phs-rulename
<rulename>] [iptos-low <value>] [iptos-high <value>] [iptos-mask
<value>] [iptos-enable]
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [priority <priority>] | Denotes the priority level to be assigned to the classification rule. | Optional | 0 | 0-255 |
| [phs-rulename <rulename>] | Indicates the Packet Header Suppression (PHS) rule name to be associated with the classification rule. Specify the PHS rulename if you want to perform PHS for this flow. For more information about configuring PHS rules, refer Section 4.3.10.16. | Optional | None | String |
| [iptos-low <value>] | Denotes the value of the lowest IP TOS field to define the lowest value where the range can begin. | Optional | 0 | 0-63 |
| [iptos-high <value>] | Denotes the value of highest IP TOS field to define the highest value where the range can end. | Optional | 255 | 0-63 |
| [iptos-mask <value>] | Denotes the mask for IP TOS value.This mask is applied to the TOS field received in the IP header to be matched within the TOS range configured. | Optional | 255 | 0-63 |
| [iptos-enable] | Indicates whether the use of TOS-based classification is to be enabled. | Optional | By default, the use of TOS-based classification is disabled. | The presence/absence of this flag indicates that the use of TOS-based classification should be enabled/disabled. |

| | |
|---|---|
| **Command Modes** | Classification rules configuration mode |

### 4.3.10.15.5.3 Restoring the Default Parameters for the Classification Rule

Run the following command to restore the default configuration for this classification rule.

```
npu(config-clsfrule)# no [priority] [iptos-low] [iptos-high]
[iptos-mask] [iptos-enable]
```

**NOTE**

Refer to Section 4.3.10.15.5.3 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule)# no [priority] [iptos-low] [iptos-high] [iptos-mask] [iptos-enable]` |
| **Privilege Level** | 10 |
| **Command Modes** | Classification rules configuration mode |

### 4.3.10.15.5.4 Managing Protocol Configuration

Classification rules can classify the packet, based on the value of IP protocol field. You can configure the value of IP protocol for a given classification rule.

**To configure one or more IP protocols:**

1. Enable the IP protocol configuration mode (refer to Section 4.3.10.15.5.4.1)
2. Enable/disable protocol lists (refer to Section 4.3.10.15.5.4.2 and Section 4.3.10.15.5.4.3)
3. Terminate the protocol configuration mode (refer to Section 4.3.10.15.5.4.4)

In addition, you can, at any time, delete an existing protocol list (refer to Section 4.3.10.15.5.4.5).

The following example illustrates the (sequence of) commands for enabling the protocol lists configuration mode, enabling a protocol list, and then terminating the protocol lists configuration mode:

```
npu(config-clsfrule)# ip-protocol

npu(config-clsfrule-protocol)# protocol-enable 2 list1 list2

npu(config-clsfrule-protocol)# exit
```

### 4.3.10.15.5.4.1Enabling the IP Protocol Configuration Mode

Run the following command to enable the IP protocol configuration mode.

```
npu(config-clsfrule)# ip-protocol
```

You can now enable or disable a protocol list (refer to Section 4.3.10.15.5.4.2 and Section 4.3.10.15.5.4.3).

| | |
|---|---|
| **Command Syntax** | **npu(config-clsfrule)# ip-protocol** |
| **Privilege Level** | 10 |
| **Command Modes** | Classification rules configuration mode |

### 4.3.10.15.5.4.2Enabling Protocol Lists

After enabling the protocol configuration mode, run the following command to enable one or more IP protocol lists:

**npu(config-clsfrule-protocol)# protocol-enable** <number of protocols(1-6)> <protocol1> [<protocol2>] [...]

| | |
|---|---|
| **Command Syntax** | **npu(config-clsfrule-protocol)# protocol-enable** <number of protocols(1-6)> <protocol1> [<protocol2>] [...] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <number of protocols(1-6)> | Indicates the number of protocol lists to be enabled. In the current release, only one protocol can be enabled per classification rule. | Optional | N/A | 1 |
| <protocol1> [<protocol2>] [...] | Indicates the PROTOCOLS to be enabled. | Optional | N/A | String (Using standard IANA protocol values) |

**Command Modes**

Classification rules-IP protocol configuration mode

### *4.3.10.15.5.4.3Disabling Protocol Lists*

After enabling the protocol configuration mode, run the following command to disable one or more IP protocol lists:

**npu(config-clsfrule-protocol)# no protocol-enable** <number of protocols(1-6)> <protocol1> [<protocol2>] [...]

**Command Syntax**

**npu(config-clsfrule-protocol)# no protocol-enable** <number of protocols(1-6)> <protocol1> [<protocol2>] [...]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <number of protocols(1-6)> | Indicates the number of protocol lists to be disabled. | Mandatory | N/A | 1-6 |
| <protocol1> [<protocol2>] [...] | Indicates the protocols to be disabled. You are required to specify at least one protocol that is to be disabled. | Mandatory | N/A | String |

| | |
|---|---|
| **Command Modes** | Classification rules-IP protocol configuration mode |

#### 4.3.10.15.5.4.4Terminating the Protocol Configuration Mode

Run the following command to terminate the IP protocol configuration mode:

```
npu(config-clsfrule-protocol)# exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule-protocol)# exit` |
| **Privilege Level** | 10 |
| **Command Modes** | Classfication rule-IP protocol configuration mode |

#### 4.3.10.15.5.4.5Deleting Protocol Lists

You can, at any time, run the following command to delete one or all protocol lists:

```
npu(config-clsfrule)# no ip-protocol
```

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule)# no ip-protocol` |
| **Privilege Level** | 10 |
| **Command Modes** | Classfication rule-IP protocol configuration mode |

### 4.3.10.15.5.5Managing Source Address Configuration

Classification rules can classify the packet, based on the source address of the packet. You can configure the value of source address for a given classification rule.

**To configure one or more source addresses:**

1. Enable the source address configuration mode (refer to Section 4.3.10.15.5.5.1)
2. You can now execute any of the following tasks:
   - » Configure the address mask (refer to Section 4.3.10.15.5.5.2)
   - » Disable the source address (refer to Section 4.3.10.15.5.5.3)
3. Terminate the source address configuration mode (refer to Section 4.3.10.15.5.5.4)

You can, at any time, delete an existing source address (refer to Section 4.3.10.15.5.5.5).

The following example illustrates the (sequence of) commands for enabling the source address configuration mode, configuring the address mask, and then terminating the source address configuration mode:

```
npu(config-clsfrule)# srcaddr 10.203.155.20

npu(config-clsfrule-srcaddr)# config addr-enable addr-mask
255.255.0.0

npu(config-clsfrule-srcaddr)# exit
```

### *4.3.10.15.5.5.1Enabling the Source Address Configuration Mode\ Creating a New Source Address*

To configure the parameters for a source address, first enable the source address configuration mode. Run the following command to enable the source address configuration mode. You can also use this command to create a new source address.

```
npu(config-clsfrule)# srcaddr <ipv4addr>
```

If you use this command to specify a new source address, the configuration mode for the newly created source address is automatically enabled, after which you can execute any of the following tasks:

- Configure the address mask (refer to Section 4.3.10.15.5.5.2)
- Disable the source address (refer to Section 4.3.10.15.5.5.3)

After you have executed these tasks, terminate the source address configuration mode to return to the service classification rule configuration mode (refer to Section 4.3.10.15.5.5.4).

**IMPORTANT**

An error may occur if you provide an invalid source IP address. Refer the syntax description for more information about the appropriate value and format for configuring this parameter.

**Command Syntax**

```
npu(config-clsfrule)# srcaddr <ipv4addr>
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ipv4addr> | Denotes the IPv4 address of the source address for which the configuration mode is to be enabled. If you want to create a new source address, specify the value for the new source address. The source address configuration mode is automatically enabled. | Mandatory | N/A | Valid IP Address |

**Command Modes**

Classification rules configuration mode

### *4.3.10.15.5.5.2Configuring the Address Mask*

After enabling the source address configuration mode, run the following command to configure the address mask for the source address.

```
npu(config-clsfrule-srcaddr)# config [addr-enable] [addr-mask <value>]
```

You can also run this command to enable a source address that is currently disabled. For details, refer to “Disabling the Source Address” on page 346.

**IMPORTANT**

An error may occur if you provide an invalid address mask for the source address. Refer the syntax description for more information about the appropriate value and format for this parameter.

**Command Syntax**

```
npu(config-clsfrule-srcaddr)# config [addr-enable] [addr-mask <value>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [addr-enable] | Indiactes that the use of the associated source address is enabled for the classification rule that you are configuring. If the use of this address is disabled, the associated source address is ignored while classifying the packet. | Optional | By default, the use of the associated source address is disabled. | The presence/absence of this flag indicates that the use of the associated source address is enabled/disabled. |
| [addr-mask <value>] | Denotes the mask field that is used to specify a range of source addresses. | Optional | N/A | Valid address mask |

**Command Modes**

Classification rules-source address configuration mode

### *4.3.10.15.5.5.3Disabling the Source Address*

You can run the following command to disable the source address that is currently enabled:

```
npu(config-clsfrule-srcaddr)# no addr-enable
```

**IMPORTANT**

To enable this source address, run the following command:

```
npu(config-clsfrule-srcaddr)# config [addr-enable] [addr-mask <value>]
```

For details, refer to “Configuring the Address Mask” on page 345.

**Command Syntax**

```
npu(config-clsfrule-srcaddr)# no addr-enable
```

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | Classification rules-source address configuration mode |

### 4.3.10.15.5.5.4Terminating the Source Address Configuration Mode

Run the following command to terminate the source address configuration mode:

```
npu(config-clsfrule-srcaddr)# exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule-srcaddr)# exit` |

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | Classfication rule-source address configuration mode |

### 4.3.10.15.5.5.5Deleting Source Addresses

You can, at any time, run the following command to delete one or all source addresses

```
npu(config-clsfrule)# no srcaddr [<ipv4addr>]
```

**CAUTION**

Specify the IP address  if you want to delete a specific source address. Otherwise all the configured source addresses are deleted.

**IMPORTANT**

An error may occur if you provide an invalid IP address. Refer the syntax description for more information about the appropriate values and format for configuring this parameter.

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule)# no srcaddr [<ipv4addr>]` |

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<ipv4addr>]` | Denotes the IPv4 address of the source address that you want to delete from a classification rule.<br>Specify this parameter only if you want to delete a specific source address. If you do not specify a value for this parameter, all the source addresse | Optional | N/A | Valid IP Address |

**Command Modes** Classification rules configuration mode

### 4.3.10.15.5.6Managing Destination Address Configuration

Classification rules can classify the packet, based on the destination address of the packet. You can configure the value of destination address for a given classification rule.

**To configure one or more destination addresses:**

1. Enable the destination address configuration mode (refer to Section 4.3.10.15.5.6.1)
2. You can now execute any of the following tasks:
   - Configure the address mask (refer to Section 4.3.10.15.5.6.2)
   - Disable the destination address (refer to Section 4.3.10.15.5.6.3)
3. Terminate the destination address configuration mode (refer to Section 4.3.10.15.5.6.4)

In addition, you can, at any time, delete an existing destination address (refer to Section 4.3.10.15.5.6.5).

The following example illustrates the (sequence of) commands for enabling the source address configuration mode, configuring the address mask, and then terminating the destination address configuration mode:

```
npu(config-clsfrule)# dstaddr 10.203.155.22

npu(config-clsfrule-dstaddr)# config addr-enable addr-mask
0.0.255.255

npu(config-clsfrule-srcaddr)# exit
```

### *4.3.10.15.5.6.1Enabling the Destination Address Configuration Mode\ Creating a New Destination Address*

To configure the parameters for a destination address, first enable the destination address configuration mode. Run the following command to enable the destination address configuration mode. You can also use this command to create a new destination address.

```
npu(config-clsfrule)# dstaddr <ipv4addr>
```

If you use this command to specify a new destination address, the configuration mode for the newly created destination address is automatically enabled, after which you can execute any of the following tasks:

- Configure the address mask (refer to Section 4.3.10.15.5.6.2)k
- Disable the destination address (refer to Section 4.3.10.15.5.6.3)

After you execute these tasks, you can terminate the destination address configuration mode (refer to Section 4.3.10.15.5.6.4) and return to the classification rules configuration mode.

**IMPORTANT**

An error may occur if you provide an invalid destination IP address. Refer the syntax description for more information about the appropriate values and format for configuring this parameter.

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule)# dstaddr <ipv4addr>` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ipv4addr> | Denotes the IPv4 address of the destination address for which the configuration mode is to be enabled. If you want to create a new destination address, specify the value for the new destination address. The destination address configuration mode is automatically enabled. | Mandatory | N/A | Valid IP Address |

**Command Modes** Classification rules configuration mode

### *4.3.10.15.5.6.2Configuring the Address Mask*

Run the following command to configure the address mask for the destination address.

**npu(config-clsfrule-dstaddr)# config** [**addr-enable**] [**addr-mask** <value>]

You can also run this command to enable a destination address that is currently disabled. For details, refer to "Disabling the Destination Address" on page 351.

**IMPORTANT**

An error may occur if you provide an invalid address mask. Refer the syntax description for more information about the appropriate values and format for configuring this parameter.

**Command Syntax** **npu(config-clsfrule-dstaddr)# config** [**addr-enable**] [**addr-mask** <value>]

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[addr-enable]` | Indicates that the use of the associated destination address is enabled for the classification rule that you are configuring. If the use of this address is disabled, the associated destination address is ignored while classifying the packet. | Optional | By default, the use of the associated destination address is disabled. | The presence/absence of this flag indicates that the use of the associated destination address is enabled/disabled. |
| `[addr-mask <value>]` | Denotes the mask field that is used to specify a range of destination addresses. | Optional | N/A | Valid address mask |

**Command Modes** Classification rules-destination address configuration mode

### 4.3.10.15.5.6.3Disabling the Destination Address

Run the following command to disable the destination address that is currently enabled:

```
npu(config-clsfrule-dstaddr)# no addr-enable
```

**Command Syntax**

```
npu(config-clsfrule-dstaddr)# no addr-enable
```

**Privilege Level** 10

**Command Modes** Classification rules-destination address configuration mode

### 4.3.10.15.5.6.4Terminating the Destination Address Configuration Mode

Run the following command to terminate the destination address configuration mode:

```
npu(config-clsfrule-dstaddr)# exit
```

| | |
|---|---|
| **Command Syntax** | **`npu(config-clsfrule-dstaddr)# exit`** |
| **Privilege Level** | 10 |
| **Command Modes** | Classfication rule-destination address configuration mode |

### *4.3.10.15.5.6.5Deleting Destination Addresses*

You can, at any time, run the following command to delete one or all destination addresses

**`npu(config-clsfrule)# no dstaddr`** `[<ipv4addr>]`

**CAUTION**

Specify the IP address if you want to delete a specific destination address. Otherwise all the configured destination addresses are deleted.

**IMPORTANT**

An error may occur if you provide an invalid IP address. Refer the syntax description for more information about the appropriate values and format for configuring this parameter.

| | |
|---|---|
| **Command Syntax** | **`npu(config-clsfrule)# no dstaddr`** `[<ipv4addr>]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<ipv4addr>]` | Denotes the IPv4 address of the destination address that you want to delete from a classification rule.<br>Specify this parameter only if you want to delete a specific destination address. | Optional | N/A | Valid IP Address |

**Command Modes** Classification rules configuration mode

### 4.3.10.15.5.7Managing Source Port Configuration

Classification can be based on the source port of the packet. You can configure the value of a source port for a given classification rule.

**To configure one or more source ports:**

1. Enable the source port configuration mode (refer to Section 4.3.10.15.5.7.1)
2. Enable/disable the source port range (refer to Section 4.3.10.15.5.7.2/Section 4.3.10.15.5.7.3)
3. Terminate the source port configuration mode (refer to Section 4.3.10.15.5.7.4)

In addition, you can, at any time, delete an existing source port configuration (refer to Section 4.3.10.15.5.7.5).

The following example illustrates the (sequence of) commands for enabling the source port configuration mode, enabling the source port range, and then terminating the source port configuration mode:

```
npu(config-clsfrule)# srcport 20 50
npu(config-clsfrule-srcport)# port-enable
npu(config-clsfrule-srcport)# exit
```

### 4.3.10.15.5.7.1Enabling the Source Port Configuration Mode\ Creating a New Source Port

To configure the parameters for a source port, first enable the source port configuration mode. Run the following command to enable the source port configuration mode. You can also use this command to create a new source port.

```
npu(config-clsfrule)# srcport <start-port> <end-port>
```

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

If you use this command to specify a new source port, the configuration mode for the newly created source port is automatically enabled, after which you can enable/disable the source port range (refer to Section 4.3.10.15.5.7.2/Section 4.3.10.15.5.7.3).

You can then terminate the source port configuration mode (refer to Section 4.3.10.15.5.7.4) and return to the classification rules configuration mode.

**Command Syntax**

```
npu(config-clsfrule)# srcport <start-port> <end-port>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <start-port> | Denotes the starting value of port range to be configured. | Mandatory | N/A | 1-65535 |
| <end-port> | Denotes the end value of port range to be configured. | Mandatory | N/A | 1-65535 |

**Command Modes**

Classification rules configuration mode

### 4.3.10.15.5.7.2Enabling the Source Port Range

Run the following command to enable the source port range:

```
npu(config-clsfrule-srcport)# port-enable
```

You can also run this command to enable a source port range that is currently disabled. For details, refer to “Disabling the Source Port Range” on page 355.

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule-srcport)# port-enable` |
| **Privilege Level** | 10 |
| **Command Modes** | Classification rules-source port configuration mode |

### 4.3.10.15.5.7.3Disabling the Source Port Range

Run the following command to disable the source port range that is currently enabled:

```
npu(config-clsfrule-srcport)# no port-enable
```

**IMPORTANT**

To enable this source port range, run the following command:

```
npu(config-clsfrule-srcport)# port-enable
```

For details, refer to “Enabling the Source Port Range” on page 354.

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule-srcport)# no port-enable` |
| **Privilege Level** | 10 |
| **Command Modes** | Classification rules-source port configuration mode |

### 4.3.10.15.5.7.4Terminating the Source Port Configuration Mode

Run the following command to terminate the source port configuration mode:

```
npu(config-clsfrule-srcport)# exit
```

| | |
|---|---|
| **Command Syntax** | **`npu(config-clsfrule-srcport)# exit`** |
| **Privilege Level** | 10 |
| **Command Modes** | Classfication rule-source port configuration mode |

### *4.3.10.15.5.7.5Deleting Source Ports*

Run the following command to delete one or all source ports

**`npu(config-clsfrule)# no srcport`** `[<start-port> <end-port>]`

**CAUTION**

Specify the start and end port numbers if you want to delete a specific souce port. Otherwise all the configured source ports are deleted.

**IMPORTANT**

An error may occur if you provide an invalid value for the `start-port` and `end-port` parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

| | |
|---|---|
| **Command Syntax** | **`npu(config-clsfrule)# no srcport`** `[<start-port> <end-port>]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<start-port>` | Denotes the starting value of port range to be deleted. | Optional | N/A | 1-65535 |
| `<end-port>` | Denotes the end value of port range to be deleted. | Optional | N/A | 1-65535 |

| Command Modes | Classification rules configuration mode |
|---|---|

### 4.3.10.15.5.8Managing Destination Port Configuration

Classification can be based on the destination port of the packet. You can configure the value of a destination port for a given classification rule.

**To configure one or more destination ports:**

1. Enable the destination port configuration mode (refer to Section 4.3.10.15.5.8.1)
2. Enable/disable the destination port range (refer to Section 4.3.10.15.5.8.2/Section 4.3.10.15.5.8.3)
3. Terminate the destination port configuration mode (refer to Section 4.3.10.15.5.8.4)

In addition, you can, at any time, delete an existing destination port configuration (refer to Section 4.3.10.15.5.8.5).

The following example illustrates the (sequence of) commands for enabling the destination port configuration mode, enabling the destination port range, and then terminating the destination port configuration mode:

```
npu(config-clsfrule)# dstport 50 400
npu(config-clsfrule-dstport)# port-enable
npu(config-clsfrule-dstport)# exit
```

#### *4.3.10.15.5.8.1Enabling the Destination Port Configuration Mode\ Creating a New Destination Port*

To configure the parameters for a destination port, first enable the destination port configuration mode. Run the following command to enable the destination port configuration mode. You can also use this command to create a new destination port.

```
npu(config-clsfrule)# dstport <start-port> <end-port>
```

If you use this command to specify a new destination port, the configuration mode for the newly created destination port is automatically enabled, after which you can enable/disable the destination port range (refer to Section 4.3.10.15.5.8.2/Section 4.3.10.15.5.8.3). After executing these tasks, you

can terminate the destination port configuration mode (refer to Section 4.3.10.15.5.8.4).

**IMPORTANT**

An error may occur if you provide an invalid value for the `start-port` and `end-port` parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-clsfrule)# dstport <start-port> <end-port>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<start-port>` | Denotes the starting value of port range to be configured. | Mandatory | N/A | 1-65535 |
| `<end-port>` | Denotes the end value of port range to be configured. | Mandatory | N/A | 1-65535 |

**Command Modes**

Classification rules configuration mode

### *4.3.10.15.5.8.2Enabling the Destination Port Range*

You can run the following command to enable the destination port range:

```
npu(config-clsfrule-dstport)# port-enable
```

You can also run this command to enable a destination port range that is currently disabled. For details, refer to "Disabling the Destination Port Range" on page 359.

**Command Syntax**

```
npu(config-clsfrule-dstport)# port-enable
```

**Privilege Level**

10

| | |
|---|---|
| **Command Modes** | Classification rules-destination port configuration mode |

### 4.3.10.15.5.8.3Disabling the Destination Port Range

You can run the following command to disable the destination port range that is currently enabled:

```
npu(config-clsfrule-dstport)# no port-enable
```

**IMPORTANT**

To enable this destination port range, run the following command:

```
npu(config-clsfrule-dstport)# port-enable
```

For details, refer to "Enabling the Destination Port Range" on page 358.

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule-srcport)# no port-enable` |
| **Privilege Level** | 10 |
| **Command Modes** | Classification rules-destination port configuration mode |

### 4.3.10.15.5.8.4Terminating the Destination Port Configuration Mode

Run the following command to terminate the destination port configuration mode:

```
npu(config-clsfrule-dstport)# exit
```

| | |
|---|---|
| **Command Syntax** | `npu(config-clsfrule-dstport)# exit` |
| **Privilege Level** | 10 |
| **Command Modes** | Classfication rule-destination port configuration mode |

### 4.3.10.15.5.8.5Deleting Destination Ports

Run the following command to delete one or all destination ports

```
npu(config-clsfrule)# no dstport [<start-port> <end-port>]
```

**CAUTION**

Specify the start and end port numbers  if you want to delete a specific destination port. Otherwise all the configured destination ports are deleted.

**IMPORTANT**

An error may occur if you provide an invalid value for the `start-port` and `end-port` parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-clsfrule)# no dstport [<start-port> <end-port>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<start-port>` | Denotes the starting value of port range to be deleted. | Optional | N/A | 1-65535 |
| `<end-port>` | Denotes the end value of port range to be deleted. | Optional | N/A | 1-65535 |

**Command Modes**

Classification rules configuration mode

### 4.3.10.15.5.9Terminating the Classification Rule Configuration Mode

Run the following command to terminate the classification rules configuration mode:

```
npu(config-clsfrule)# exit
```

**Command Syntax**

```
npu(config-clsfrule)# exit
```

| | |
|---|---|
| **Command Modes** | Classification rules configuration mode |

### 4.3.10.15.5.10Displaying Configuration Information for Classification Rules

To display all or specific classification rules, run the following command:

**npu# show clsf-rule** [<rulename>]

Specify the classification rule name if you want to display configuration information for a particular rule. Do not specify a value for this parameter if you want to view configuration information for all classification rules.

**IMPORTANT**

An error may occur if you provide an invalid value for the `rulename` parameter. Refer the syntax description for more information about the appropriate values and format for configuring this parameters.

| | |
|---|---|
| **Command Syntax** | **npu# show clsf-rule** [<rulename>] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<rulename>] | Denotes the name of the classification rule that you want to display.<br>Specify this parameter only if you want to display a specific classification rule. If you do not specify a rule name, it displays all configured classification rules. | Optional | N/A | String |

**Display Format**

```
Classification Rule Configuration :
[clsf-rule = <value>
priority = <value>
phs-rulename = <value>
iptos-low=<value>  iptos-high=<value>  iptos-mask=<value>
iptos-status=<value>
{src-addr=<value>  addr-mask=<value>  addr-status=<value>
……. }
{dst-addr=<value>  addr-mask=<value>  addr-status=<value>
…….. }
{src-startport=<value>  src-endport=<value>  port-status=<value>
……. }
{dst-startport=<value>  dst-endport=<value>  port-status=<value>
…….. }]
[clsf-rule = <value>
.......]
```

**Command Modes**

Global command mode

### 4.3.10.15.5.11 Deleting Classification Rules

Run the following command to delete one or all classification rules:

**`npu(config)# no clsf-rule`** `[<rulename>]`

**CAUTION**

Specify the rule name if you want to delete a specific classification. Otherwise all the configured classification rules are deleted.

**Command Syntax**

**`npu(config)# no clsf-rule`** `[<rulename>]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<rulename>]` | Denotes the name of the classification rule that you want to delete. Specify this parameter only if you want to delete a specific classification rule, otherwise all configured classification rules are deleted. | Optional | N/A | String |

**Command Modes**

Global configuration mode

## 4.3.10.16 Configuring PHS Rules

Packet Header Suppression (PHS) is a mechanism that conserves air-interface bandwidth by removing parts of the packet header that remain constant along the traffic session. PHS operates by allowing the MS and ASN-GW to associate PHS rules to each service flow.

When PHS is enabled, a repetitive portion of the payload headers of higher layers is suppressed in the MAC SDU by the sending entity and restored by the receiving entity. At the uplink, the sending entity is the MS and the receiving entity is the NPU. At the downlink, the sending entity is the NPU, and the receiving entity is the MS. If PHS is enabled at the MAC connection, each MAC SDU is prefixed with a PHSI, which references the Payload Header Suppression Field (PHSF).

For instance, the ASN-GW will associate a PHS rule to each provisioned service flow intended for VoIP traffic that will suppress the IP address field from the IP header and other unvarying fields (e.g. protocol version) from the IP and RTP headers. The PHS rules are provisioned on a per-service profile name basis. (For details, refer Section 4.3.10.15.5.)

PHS rules define:

- Header fields that need to be suppressed
- Static values that can be configured for the suppressed header fields

**To configure one or more PHS rules:**

1. Enable the PHS rules configuration mode (refer to Section 4.3.10.16.1)
2. Configure the parameters for the PHS rule (refer to Section 4.3.10.16.2)
3. Terminate the PHS rules configuration mode (refer to Section 4.3.10.16.3)

You can, at any time, display configuration information (refer to Section 4.3.10.16.5) or delete an existing PHS rules (refer to Section 4.3.10.16.4).

The following example illustrates the (sequence of) commands for enabling the PHS rules configuration mode, configuring the parameters of a PHS rule, and then terminating the PHS configuration mode, should be executed as shown in the example below:

```
npu(config)# phs-rule phs-rule1

npu(config-phsrule)# field
00000000000000000000000FFFFFFFF00000000 mask 000F00 verify 0 size
20

npu(config-phsrule)# exit
```

### 4.3.10.16.1 Enabling the PHS Rules Configuration Mode /Creating a New PHS Rule

To configure the parameters for a PHS rule, first enable the PHS rules configuration mode. Run the following command to enable the PHS rules configuration mode. You can also use this command to create a new PHS rule.

```
npu(config)# phs-rule <rulename>
```

If you use this command to create a new PHS rule, the configuration mode for this PHS rule is automatically enabled, after which you can configure the parameters for the PHS rule (refer to Section 4.3.10.16.2). You can then terminate the PHS rules configuration mode (refer to Section 4.3.10.16.3) and return to the global configuration mode.

| | |
|---|---|
| **Command Syntax** | `npu(config)# phs-rule <rulename>` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<rulename>` | Denotes the PHS rule for which the PHS configuration mode is to be enabled. | Mandatory | N/A | String |

**Command Modes**

Global configuration mode

### 4.3.10.16.2 Configuring Parameters for the PHS Rule

Run the following command to configure the parameters of the PHS rule:

```
npu(config-phsrule)# [field <value>] [mask <value>] [verify <value>] [size <value>]
```

**NOTE**

You can display configuration information for specific or all PHS rules. For details, refer Section 4.3.10.16.5.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-phsrule)# [field <value>] [mask <value>] [verify <value>] [size <value>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[field <value>]` | Denotes the PHSF value, that is, the header string to be suppressed. | Mandatory | N/A | String |

| | | | | | |
|---|---|---|---|---|---|
| | [mask <value>] | Indicates the PHSM, which contains the bit-mask of the PHSF with the bits set that is to be suppressed. | Mandatory | N/A | String |
| | [verify <value>] | Indicates whether the PHS header is to be verified. | Optional | 0 | ■ 0: Indicates that the PHS header should be verified.<br>■ 1: Indicates that the PHS header should not be verified. |
| | [**size** <value>] | Indicates the size of the header to be suppressed. | Mandatory | | 0-255 |

**Command Modes** PHS rules configuration mode

### 4.3.10.16.3 Terminating the PHS Rules Configuration Mode

Run the following command to terminate the PHS rules configuration mode:

```
npu(config-phsrule)# exit
```

**Command Syntax** `npu(config-phsrule)# exit`

**Privilege Level** 10

**Command Modes** PHS rulesconfiguration mode

### 4.3.10.16.4 Deleting PHS Rules

Run the following command to delete one or all PHS rules:

```
npu(config)# no phs-rule [<rulename>]
```

**CAUTION**

Specify the rule name if you want to delete a specific PHS rule. Otherwise all the configured PHS rules are deleted.

**Command Syntax**

**`npu(config)# no phs-rule`** `[<rulename>]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<rulename>]` | Denotes the rule name of the PHS rule that you want to delete.<br><br>Specify a value for this parameter if you want to delete a specific PHS rule. Do not specify a value for this parameter, if you want to delete all PHS rules. | Optional | N/A | String |

**Command Modes**

Classfication rule-IP protocol configuration mode

### 4.3.10.16.5 Displaying Configuration Information for PHS Rules

To display all or specific PHS rules, run the following command:

**`npu(config)# show phs-rule`** `[<rulename>]`

Specify the rule name if you want to display configuration information for a particular PHS rule. Do not specify a value for this parameter if you want to view configuration information for all PHS rule.

**IMPORTANT**

An error may occur if you provide an invalid value for the `rulename` parameter. Refer the syntax description for more information about the appropriate values and format for configuring this parameter.

**Command Syntax**

```
npu(config)# show phs-rule [<rulename>]]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<rulename>] | Denotes the rule name of the PHS rule that you want to delete.<br>Specify a value for this parameter if you want to delete a specific PHS rule. Do not specify a value for this parameter, if you want to delete all PHS rules. | Optional | N/A | String |

**Display Format**

```
PHS Configuration :
rulename field    mask   verify   size
<value>  <value> <value> <value> <value>
…….
```

**Command Modes**

Global configuration mode

## 4.3.11 Configuring Logging

Logs can be generated to record events that occur with respect to the following system modules:

- System startup procedures: Refers to all procedures/events that occur during system startup.
- NPU/AU upgrade procedures: Refers to all the procedures executed while upgrading the NPU/AU.

- Fault management procedures: Refers to internal processes that are executed for monitoring erroneous conditions or fault conditions.
- System performance procedures: Refers to internal processes that are executed for monitoring system performance.
- Shelf management procedures: Refers to internal processes that are executed for monitoring the health and temperature of all hardware components (other than the NPU) such as the AU, PIU and PSU.
- WiMAX signaling protocols: Refers to all the protocols that implement the ASN-GW functionality.
- User interface: Refers to the command line or remote management interface used for executing all user-initiated events such as system shut down or reset.
- AU Manager: Refers to all internal processes used for fault, configuration, and performance management for AU.

**IMPORTANT**

The Syslog utility is used to implement the logging feature for 4Motion.

You can specify the severity level for which log messages are to be generated for each module. Logs are generated for events for which the severity level is equal to or higher than the configured level. The following are the severity levels that you can configure for each module:

- Emergency
- Alert
- Critical
- Error
- Warning
- Notice
- Information

By default, system-level logging is enabled. The system stores a maximum of 1000 log and trace messages. The system stores log and trace messages using the cyclic buffer method. That is, when there are more than 1000 messages, the system overwrites the oldest log and trace messages.

**IMPORTANT**

It is recommended that you periodically make backups of log messages before these are overwritten. For details, refer to "Making a Backup of Log Files on the NPU Flash" on page 377.

To configure logging, first specify system-level logging that is applicable across the entire system. You can then configure logging, individually for each system module. This section describes the commands to be used for:

- "Managing System-level Logging" on page 370
- "Configuring Module-level Logging" on page 380

### 4.3.11.1 Managing System-level Logging

System-level logging refers to all the procedures to be executed for managing logging for the entire system. To manage system-level logging:

- Enable/disable logging across the entire system, and specify the destination (a file on the local system or on an external server) where logs are to be maintained.
- Make periodic backups of log files.

You can, at any time, view the current log destination or delete log files from the NPU flash. After you have enabled/disabled system-level logging and specified the destination for storing log messages, you can configure logging separately for each module. This section describes the commands to be used for:

- "Enabling System-level Logging" on page 371
- "Disabling Logging to File or Server" on page 373
- "Displaying System-level Logs" on page 375
- "Displaying the Current Log Destination" on page 376

- “Making a Backup of Log Files on the NPU Flash” on page 377
- “Deleting Backup Log Files from the NPU Flash” on page 379

#### 4.3.11.1.1 Enabling System-level Logging

You can enable logging for the entire system and specify the destination where logs should be written. The destination can be either written to:

- File
- External server (Log files are sent to the external server in the Syslog log format. The Syslog daemon on the external server can save these log messages in the appropriate format depending upon the server configuration.)

By default, system-level logging is enabled. To view whether the system-level logging is enabled/disabled for logging to file or server. For details, refer Section 4.3.11.1.4.

The system maintains a maximum of 1000 log and trace messages. The system stores log and trace messages using the cyclic buffer method. That is, when there are more than 1000 messages, the system overwrites the oldest log and trace messages.

**IMPORTANT**

If you have enabled writing of log messages to file, it is recommended that you periodically make a backup of this log file. This is because log messages that are written to file are deleted after system reset. For more information about making backups of log files on the NPU flash, refer to Section 4.3.11.1.5.

To enable system-level logging, run the following command:

```
npu(config)# log destination {file | server <IP address>}
```

**NOTE**

After you execute this command, logging is enabled for the entire system. You may also configure logging separately for each system module. For details, refer to Section 4.3.11.2.

**IMPORTANT**

An error may occur if:

- Logging is already enabled for the requested destination (file or server).
- Logging is enabled to a server with a different IP address. Because logging can be enabled to only one external server, you can specify another server IP address after you disable logging to the existing server IP address. For more information about disabling logging to server, refer "Disabling Logging to File or Server" on page 373.
- An internal error has occurred.
- You have specified the IP address in an invalid format. Specify the IP address in the format, XXX.XXX.XXX.XXX.

| | |
|---|---|
| **Command Syntax** | `npu(config)# log destination {file \| server <IP address>}` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{file\|server <IP address>}` | Indicates whether logs are to be written to a file or server. | Mandatory | N/A | ■ **`file`**: Indicates that logs are to be written to a file. (Logs written to file are not maintained after system reset; periodically save the log file to flash.) For details, refer to Section 4.3.11.1.5.<br>■ **`server`**: Indicates that logs are to be written to an external server. Specify the server IP address of the server in the format, XXX.XXX.XXX.XXX. |

**Command Modes**

Global configuration mode

### 4.3.11.1.2 Disabling Logging to File or Server

To disable logging to file or server, run the following command:

```
npu(config)# no log destination {file | server <IP address>}
```

**IMPORTANT**

An error may occur if:

- Logging is already disabled for the requested destination (file or server).
- An internal error has occurred.
- The server IP address that you have specified does not exist.

| | |
|---|---|
| **Command Syntax** | **`npu(config)# no log destination {file \| server <IP address>}`** |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{file\|server <IP address>}` | Indicates whether the system-level logs are to be disabled for a file or server. | Mandatory | N/A | ■ `file`: Indicates that system-level logging to a file is to be disabled.<br>■ `server<ip address>`: Indicates that system-level logging to a server is to be disabled. Specify the IP address if you want to disable logging to a specific server. Otherwise logging is disabled for the server that was last enabled for logging. Provide the IP address in the format, XXX.XXX.XXX.XXX. |

**Command Modes**

Global configuration mode

### 4.3.11.1.3 Displaying System-level Logs

To display system-level logs, run the following command:

```
npu# show logs
```

When you run this command, all the log messages are displayed. (4Motion maintains a maximum of 1000 log and trace messages.) If you want to filter log messages to be displayed, run the following command to specify the filter criteria:

**npu# show logs** [**filter** | **grep** <string>]

For example, if you want to view log messages pertaining to only Error logs, run the following command:

**npu# show logs filter|grep ERROR**

**IMPORTANT**

An error may occur if:

- There are no logs to be displayed.
- The log files are inaccessible or an internal error occurred while processing the result.

**Command Syntax**

**npu# show logs** [**filter** | **grep** <string>]

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [filter \| grep <string>] | Indicates the criteria for filtering the log messages to be displayed. | Optional | N/A | String |

**Command Modes**

Global command mode

### 4.3.11.1.4 Displaying the Current Log Destination

To view the current log destination, that is, whether logs are written to file or an external server, run the following command:

**npu# show log destination**

**IMPORTANT**

An error may occur if an internal error occurs when you execute this command.

| | |
|---|---|
| **Command Syntax** | **npu# show log destination** |
| **Privilege Level** | 1 |
| **Display Format** | Logfile(<file name>) : Enabled/Disabled<br>Log Server(<IP address>) : Enabled/Disabled |
| **Command Modes** | Global command mode |

### 4.3.11.1.5 Making a Backup of Log Files on the NPU Flash

The system stores a maximum of 1000 log and trace messages in the log file, after which the oldest messages are overwritten. This log file resides in the TFTP boot directory (/tftpboot/management/system_log/) of the NPU. You can TFTP this file from the NPU flash. You can display the list of log files residing on the NPU flash. For details, refer Section 4.3.11.1.7.

In addition, logs written to file are not maintained after system reset. If you have enabled writing of logs to file, it is recommended that you periodically make a backup of log messages on the NPU flash.

**IMPORTANT**

You can display a list of log files that are currently residing on the NPU flash. For details, refer Section 4.3.11.1.7.

When you make a backup of log files on the NPU flash, the last 1000 log and trace messages are stored in a compressed file, which is saved on the NPU flash. There is no limit on the number of log files that can be saved unless there is inadequate space on the NPU flash.

**IMPORTANT**

Trace messages are also written to the same file as log messages (provided you have enabled writing of trace messages to file.) When you make a backup of log files written to file, the backup file also contains trace messages (provided you have enabled writing of trace messages to file). For more information about configuring traces, refer Section 4.10.1.1.

Run the following command to make a backup of the log and trace messages (written to file), on the NPU flash:

```
npu(config)# save log file <file name.gz>
```

When you run this command, the last 1000 log and trace messages are stored in the compressed file, which is saved on the NPU flash.

**IMPORTANT**

An error may occur if:

- You have specified the file name in an invalid format. Because the backup log file is a compressed file, always suffix the file name with **.gz**.
- The length of the file name has exceeded 255 characters.
- The system was unable to compress the file or save the compressed file to flash.
- A processing error has occurred.

**Command Syntax**

```
npu(config)# save log file <file name>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <file name> | Indicates the name of the compressed file that contains the last 1000 log and trace messages. Always suffix the file name with **.gz**. | Mandatory | N/A | <file name>.gz |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

#### 4.3.11.1.6 Deleting Backup Log Files from the NPU Flash

You can delete the backup log files from the NPU flash. It is recommended that you periodically make a backup of these log files, and delete these from the NPU flash.

**IMPORTANT**

Trace and log messages are stored in the same backup file on the NPU flash. When you execute this procedure, trace messages are also deleted from the NPU flash. For details, refer to "Managing System-level Tracing" on page 801.

To delete log and trace backup files from the NPU flash, run the following command:

```
npu(config)# erase log file [<file name>]
```

**CAUTION**

Specify the file name if you want to delete a specific backup file. Otherwise all the backup files residing in the NPU flash are deleted.

**IMPORTANT**

An error may occur if:

- The file name that you have specified does not exist.
- A processing error has occurred.

| | |
|---|---|
| **Command Syntax** | `npu(config)# erase log file [<file name>]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[<file name>]` | Indicates the name of the compressed log file to be deleted. If you do not specify the file name, all the log files residing in the NPU flash are deleted.<br>Always suffix the file name with **.gz**. | Optional | N/A | <file name>.gz |

**Command Modes**

Global configuration mode

#### 4.3.11.1.7 Displaying Log Files Residing on the NPU Flash

You can display a list of log files that are residing on the NPU flash. For details, refer Section 4.9.3.

### 4.3.11.2 Configuring Module-level Logging

You can configure logging (enable/disable) separately for the following modules, and define the severity level for which logging is required:

- System startup procedures
- NPU/AU upgrade procedures
- Fault management procedures
- System performance procedures
- Shelf management procedures
- WiMAX signaling protocols
- User interface
- AU management procedures

This section describes the commands to be used for:

- "Configuring the Log Severity Level" on page 381
- "Displaying Configuration Information for Module-level Logging" on page 383
- "Disabling Module-level Logging" on page 384


#### 4.3.11.2.1 Configuring the Log Severity Level

You can configure the severity level for logs to be generated for each module. This means that if an event occurs for a module for which the severity level is equal to or higher than the configured level, a log is generated. The following are the severity levels (highest to lowest) that can be configured for each module:

- Emergency
- Alert
- Critical
- Error
- Warning
- Notice
- Information

**IMPORTANT**

By default, logging is enabled for all modules, and the severity level is Error. The severity levels recorded in 4Motion log messages are defined in RFC 3164.

To specify the severity level for each module for which logs are to be created, run the following command:

```
npu(config)# log level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AU
Mgr}] {EMERG|ALERT|CRIT|ERROR|WARN|NOTICE|INFO}
```

The parameters in this command correspond to the system modules/procedures listed in the following table:

**Table 4-21: Modules for which Logging can be Enabled**

| Parameter | Refers to... |
|---|---|
| StartupMgr | System startup procedures |
| SWDownload | Software upgrade procedures |
| FaultMgr | Fault management procedures |
| ShelfMgr | Shelf management procedures |
| SIGASN | WiMAX signaling protocols |
| UserIF | User-initiated procedures |
| AUMgr | Internal processes used for managing AU |
| PerfMgr | Performance management procedures |

Specify the module name if you want to configure the severity level separately for this module. If you do not specify the name of the module, the severity level that you configure in this command is applied to all modules.

For example, run the following command if you want logs to be created for WiMAX signaling protocols when the severity level is Warning or higher:

```
npu(config)# log level SIGASN WARN
```

Or run the following command to set the severity level to Error for all modules:

```
npu(config)# log level ERROR
```

**NOTE**

You can display the currently configured severity levels for each module. For details, refer Section 4.3.11.2.2.

**Command Syntax**

```
npu(config)# log level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
{EMERG|ALERT|CRIT|ERROR|WARN|NOTICE|INFO}
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[{StartupMgr\|SWDownload\|FaultMgr\|PerfMgr\|ShelfMgr\|SIGASN\|UserIF\|AUMgr}]` | Indicates the name of the module for which the severity level is to be specified.<br>If you do not specify any value for this parameter, the severity level that you specify is applied for all modules. For more information about these parameters, refer Table 4-21. | Optional | N/A | ■ StartupMgr<br>■ SWDownload<br>■ FaultMgr<br>■ PerfMgr<br>■ ShelfMgr<br>■ SIGASN<br>■ UserIF<br>■ AUMgr |
| `{EMERG\|ALERT\|CRIT\|ERROR\|WARN\|NOTICE\|INFO}` | Indicates the severity level to be applied to a particular or all modules. | Mandatory | Error | ■ EMERG<br>■ ALERT<br>■ CRIT<br>■ ERROR<br>■ WARN<br>■ NOTICE<br>■ INFO |

**Command Modes**

Global configuration mode

### 4.3.11.2.2 Displaying Configuration Information for Module-level Logging

To display the log level configured for one or all modules, run the following command.

**`npu(config)# show log level [{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]`**

Specify the module for which you want to view the configured severity level. If you do not specify the name of the module, the log level configured for all modules is displayed.

**Command Syntax**

```
npu(config)# show log level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [{StartupMgr\|SWDownload\|FaultMgr\|PerfMgr\|ShelfMgr\|SIGASN\|UserIF\|AUMgr}] | Indicates the name of the module for which you want to view the configured severity level. For more information about these parameters, refer Table 4-21.<br>If you do not specify any value for this parameter, the severity level is displayed for all modules. | Optional | N/A | ■ StartupMgr<br>■ SWDownload<br>■ FaultMgr<br>■ PerfMgr<br>■ ShelfMgr<br>■ SIGASN<br>■ UserIF<br>■ AUMgr |

**Display Format**

```
Module Name     :   Log level
<Module Name>   :   <Log Level>
```

**Command Modes**

Global configuration mode

### 4.3.11.2.3 Disabling Module-level Logging

To disable logging for one or all system modules, run the following command:

```
npu(config)# no log level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

Specify the name of the module if you want to disable logging for a specific module. If you do not specify the module name, logging is disabled for all modules.

**Command Syntax**

```
npu(config)# no log level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[{StartupMgr\|SWDownload\|FaultMgr\|PerfMgr\|ShelfMgr\|SIGASN\|UserIF\|AUMgr}]` | Indicates the name of the module for which logging is to be disabled.<br>If you do not specify any value for this parameter, logging is disabled for all parameters. For more information about these modules, refer Table 4-21. | Optional | N/A | ■ StartupMgr<br>■ SWDownload<br>■ FaultMgr<br>■ PerfMgr<br>■ ShelfMgr<br>■ SIGASN<br>■ UserIF<br>■ AUMgr |

**Command Modes**

Global configuration mode

## 4.3.12 Configuring Performance Data Collection

You can configure 4Motion to periodically collect and store performance counters with respect to the following groups:

- NPU DATA port
- NPU MGMT port
- NPU CASCADE port
- AU ports
- NPU internal-management interface

- NPU external-management interface
- NPU local-management interface
- NPU bearer interface
- Service Flow Authorization functionality
- Data path functionality
- AAA client functionality
- Authenticator function
- Context function
- DHCP proxy functionality
- DHCP relay functionality
- DHCP server functionality
- IGMP functionality
- MIP client
- MIP-FA functionality
- MS state change functionality

**IMPORTANT**

The IGMP, MIP client, and MIP-FA functionalities are not supported in the current release.

You can specify the group for which performance data is to be stored and collected, and the interval after which this data should be fetched.

The data is stored in an XML file called, prf_yyyymmddhhmm.xml.gz in the path, TFTP/boot/Management/Performance Manager. The system maintains this data for a maximum of 24 hours after which it is deleted. It is recommended that you periodically make a backup of these files on an external server.

You can enable/disable collection of performance data for each group separately. In addition, you can specify the interval after which this data should be obtained from each group. This section describes:


- "Performance Data Counters Collected for Each Group" on page 387
- "Enabling Collection and Storage of Historical Performance Data" on page 398
- "Disabling Collection and Storage of Performance Data" on page 402
- "Displaying the Status of Performance Data Collection" on page 403


### 4.3.12.1 Performance Data Counters Collected for Each Group

Performance data counters are collected for each group with respect to the parameters listed in the following tables:

**Table 4-22: Performance Data Collected for the NPU Backhaul Port**

| Perfomance Data Collected | For the Number of... |
|---|---|
| cntNpuBckhlPortInOctet | Octets received on this interface |
| cntNpuBckhlPortInUcastPkt | Multicast packets received on this interface |
| cntNpuBckhlPortInMulticastPkt | Multicast packets received on this interface |
| cntNpuBckhlPortInBroadcastPkt | Broadcast packets received on this interface |
| cntNpuBckhlPortInDiscards | Received packets discarded on this interface, though these had no errors |
| cntNpuBckhlPortInErrors | Received packets with errors on this interface |
| cntNpuBckhlPortInUnknownProtos | Packets received with unknown protocol on this interface |
| cntNpuBckhlPortOutOctet | Octets transmitted from the interface |
| cntNpuBckhlPortOutUcastPkt | Unicast packets transmitted from this interface |
| cntNpuBckhlPortOutMulticastPkt | Multicast packets transmitted from this interface |
| cntNpuBckhlPortOutBroadcastPkt | Broadcast packets transmitted from this interface |
| cntNpuBckhlPortOutDiscards | Transmitted packets discarded on this interface, though these had no errors |
| cntNpuBckhlPortOutErrors | Transmitted packets with errors on this interface |

**Table 4-23: Performance Data Collected for the NPU Management Port**

| Perfomance Data Collected | For the Number of... |
|---|---|

**Table 4-23: Performance Data Collected for the NPU Management Port**

| | |
|---|---|
| cntNpuMgmtPortInOctet | Octets received on this interface |
| cntNpuMgmtPortInUcastPkt | Unicast packets received on this interface |
| cntNpuMgmtPortInMulticastPkt | Multicast packets received on this interface |
| cntNpuMgmtPortInBroadcastPkt2 | Broadcast packets received on this interface |
| cntNpuMgmtPortInDiscards | Received packets discarded on this interface, though these had no errors |
| cntNpuMgmtPortInErrors | Received packets with errors on this interface |
| cntNpuMgmtPortInUnknownProtos | Packets received with unknown protocol on this interface |
| cntNpuMgmtPortOutOctet | Octets transmitted from the interface |
| cntNpuMgmtPortOutUcastPkt | Unicast packets transmitted from this interface |
| cntNpuMgmtPortOutMulticastPkt | Multicast packets transmitted from this interface |
| cntNpuMgmtPortOutBroadcastPkt | Broadcast packets transmitted from this interface |
| cntNpuMgmtPortOutDiscards | Transmitted packets discarded on this interface, though these had no errors |
| cntNpuMgmtPortOutErrors | Transmitted packets with errors on this interface |

**Table 4-24: Performance Data Collected for the NPU Cascading Port**

| Perfomance Data Collected | For the Number of... |
|---|---|
| cntNpuCascPortInOctet | Octets received on this interface |
| cntNpuCascPortInUcastPkt | Unicast packets received on this interface |
| cntNpuCascPortInMulticastPkt | Multicast packets received on this interface |
| cntNpuCascPortInBroadcastPkt | Broadcast packets received on this interface |
| cntNpuCascPortInDiscards | Received packets discarded on this interface, though these had no errors |
| cntNpuCascPortInErrors | Received packets with errors on this interface |
| cntNpuCascPortInUnknownProtos | Packets received with unknown protocol on this interface |
| cntNpuCascPortOutOctet | Octets transmitted from the interface |
| cntNpuCascPortOutUcastPkt | Unicast packets transmitted from this interface |

**Table 4-24: Performance Data Collected for the NPU Cascading Port**

| | |
|---|---|
| cntNpuCascPortOutMulticastPkt | Multicast packets transmitted from this interface |
| cntNpuCascPortOutBroadcastPkt | Broadcast packets transmitted from this interface |
| cntNpuCascPortOutDiscards | Transmitted packets discarded on this interface, though these had no errors |
| cntNpuCascPortOutErrors | Transmitted packets with errors on this interface |

**Table 4-25: Performance Data Collected for the AU Management Port**

| Perfomance Data Collected | For the Number of... |
|---|---|
| cntAuPortInOctet | Octets received on this interface |
| cntAuPortInOctet | Octets received on this interface |
| cntAuPortInUcastPkt | Unicast packets received on this interface |
| cntAuPortInMulticastPkt | Multicast packets received on this interface |
| cntAuPortInBroadcastPkt | Broadcast packets received on this interface |
| cntAuPortInDiscards | Received packets discarded on this interface, though these had no errors |
| cntAuPortInErrors | Received packets with errors on this interface |
| cntAuPortInUnknownProtos | Packets received with unknown protocol on this interface |
| cntAuPortOutOctet | Octets transmitted from the interface |
| cntAuPortOutUcastPkt | Unicast packets transmitted from this interface |
| cntAuPortOutMulticastPkt | Multicast packets transmitted from this interface |
| cntAuPortOutBroadcastPkt | Broadcast packets transmitted from this interface |
| cntAuPortOutDiscards | Transmitted packets discarded on this interface, though these had no errors |
| cntAuPortOutErrors | Transmitted packets with errors on this interface |

**Table 4-26: Performance Data Collected for the NPU Internal-Management Interface**

| Perfomance Data Collected | For the Number of... |
|---|---|
| cntNpuIntMgmtInOctet | Octets received on this interface |

**Table 4-26: Performance Data Collected for the NPU Internal-Management Interface**

| | |
|---|---|
| cntNpuIntMgmtInPkt | Packets received on this interface |
| cntNpuIntMgmtInDiscards | Received packets discarded on this interface, though these had no errors |
| cntNpuIntMgmtInErrors | Received packets with errors on this interface |
| cntNpuIntMgmtOutOctet | Octets transmitted from this interface |
| cntNpuIntMgmtOutPkt | Packets transmitted from this interface |

**Table 4-27: Performance Data Collected for the NPU External-Management Interface**

| Perfomance Data Collected | For the Number of... |
|---|---|
| cntNpuExtMgmtInOctet | Octets received on this interface |
| cntNpuExtMgmtInPkt | Packets received on this interface |
| cntNpuExtMgmtInDiscards | Received packets discarded on this interface, though these had no errors |
| cntNpuExtMgmtInErrors | Received packets with errors on this interface |

**Table 4-28: Performance Data Collected for the NPU Local-Management Interface**

| Perfomance Data Collected | For the Number of... |
|---|---|
| cntNpuLclMgmtInOctet | Octets received on this interface |
| cntNpuLclMgmtInPkt | Packets received on this interface |
| cntNpuLclMgmtInDiscards | Received packets discarded on this interface, though these had no errors |
| cntNpuLclMgmtInErrors | Received packets with errors on this interface |
| cntNpuLclMgmtOutOctet | Octets transmitted from this interface |
| cntNpuLclMgmtOutPkt | Packets transmitted from this interface |

**Table 4-29: Performance Data Collected for the NPU Bearer Interface**

| Perfomance Data Collected | For the Number of... |
|---|---|
| cntNpuBearerInOctet | Octets received on this interface |
| cntNpuBearerInPkt | Packets received on this interface |
| cntNpuBearerInDiscards | Received packets discarded on this interface, though these had no errors |
| cntNpuBearerInErrors | Received packets with errors on this interface |

**Table 4-29: Performance Data Collected for the NPU Bearer Interface**

| | |
|---|---|
| cntNpuBearerOutOctet | Octets transmitted from this interface |
| cntNpuBearerOutPkt | Packets transmitted from this interface |

**Table 4-30: Performance Data Collected for the SFA Functionality**

| Perfomance Data Collected | For the Number of... |
|---|---|
| sfaQosMappingFail | Authentication failures due to QoS mapping failure |
| sfaSfDescMissing | Authentication failures due to missing service flow descriptor |
| sfaDfltLpApplied | MS for which default local policy has been applied |
| sfaRejMsDueMissingProf | MS rejected due to missing service profile |
| sfaRejMs | MS rejected |
| sfaLocalServProfApplied | MS for which local service profile has been applied |

**Table 4-31: Performance Data Collected for the Data Path Functionality**

| Perfomance Data Collected | For the Number of... |
|---|---|
| dpPathRegReqRx | Path registration request messages received |
| dpPathRegReqTx | Path deregistration report messages transmitted |
| dpPathDeregRprtRtx | Path deregistration report message retransmissions |
| dpPathDeregRprtDrop | Path deregistration report messages dropped |
| dpPathDeregRprtAckRx | Path deregistration report ack messages received |
| dpPathDeregRprtAckTx | Path deregistration report ack messages transmitted |
| dpPathDeregRprtAckDrop | Path deregistration report ack messages dropped |
| dpActiveSF | Active Service Flows in the system |
| dpActiveGRESessions | Active GRE Sessions in the system |
| dpInvalidEvent | Invalid events occurred due to reception of datapath messages |

**Table 4-32: Performance Data Collected for the AAA Client Functionality**

| Perfomance Data Collected | For the Number of... |
|---|---|
| radAccessReqTx | Radius access request messages transmitted |
| radAccessReqRtx | Radius access request message retransmissions |
| radAccessChallengeRx | Radius access challenge messages received |
| radAccessAcceptRx | Radius access accept messages received |
| radAccessRejectRx | Radius access reject messages received |
| radAccessChallengeDrop | Radius access challenge messages dropped |
| radAccessAcceptDrop | Radius access accept messages dropped |
| radAccessRejectDrop | Radius access reject messages dropped |
| radTimerAccessReqExp | Timer expiries while awaiting response for radius access request message sent |
| radInvalidEvent | invalid events occurred due to reception of Radius messages |
| radMsProfileChange | MS reauthentications with different MS profile received in access accept message |
| radEapMismatch | Radius access accept/reject messages received with EAP status mismatch |
| radCounterAccessReqExp | Radius access request retries failure |

**Table 4-33: Performance Data for Authenticator Functionality**

| Perfomance Data Collected | For the Number of .... |
|---|---|
| eapIdReqRtx | EAP ID request retransmissions |
| eapIdRspRx | EAP ID response messages received |
| eapIdRspDrop | EAP ID response messages dropped |
| eapTransferTx | EAP transfer message transmissions |
| eapTransferRtx | EAP transfer message retransmissions |
| eapTransferRx | EAP transfer messages received |
| eapTransferDrop | EAP transfer messages dropped |

**Table 4-33: Performance Data for Authenticator Functionality**

| | |
|---|---|
| eapStartRx | EAP start messages received |
| eapStartDrop | EAP start messages dropped |
| eapCounterIdReqExp | EAP ID request retries failure |
| eapCounterTransferExp | EAP transfer retries failure |
| eapRndOver | Times EAP transfer rounds counter exceeds threshold |
| eapAuthSuccess | Successful MS authentications |
| eapAuthFailure | Failed MS authentications |
| eapAuthAttempts | MS authentication attempts |
| eapReauthSuccess | Successful MS re-authentications |
| eapReauthFailure | Failed MS re-authentications |
| eapReauthAttempts | MS re-authentication attempts |
| eapInvalidNai | Times an invalid NAI is received in EAP ID response message |
| eapInvalidNaiLen | Times an NAI with invalid length is received in EAP ID response message |
| eapInvalidNaiRealm | Times an NAI with invalid realm is received in EAP ID response message |
| eapInvalidNaiPseudoId | Times an NAI with invalid pseudo identifier is received in EAP ID response message |
| eapNaiMismatchAuthMode | Times an NAI with invalid authentication mode is received in EAP ID response message |
| arpEapTransferTx | ARP transfer message (EAP-ID / EAP transfer) transmissions |
| arpEapTransferRx | ARP transfer message (EAP-ID / EAP transfer) received |
| arpEapTransferDrop | ARP transfer message (EAP-ID / EAP transfer) dropped |
| arpEapStartRx | ARP (EAP start) messages received |
| arpEapStartDrop | ARP (EAP start) messages dropped |

**Table 4-34: Performance Data Collected for the Context Function**

| Perfomance Data Collected | For the Number of ... |
|---|---|
| ctxtfnCtxtReqTx | Context request messages transmitted |

**Table 4-34: Performance Data Collected for the Context Function**

| | |
|---|---|
| ctxtfnCtxtReqRtx | Context request messages retransmissions |
| ctxtfnCtxtReqRx | Context request messages received |
| ctxtfnCtxtReqDrop | Context request messages dropped |
| ctxtfnCtxtRprtTx | Context report messages transmitted |
| ctxtfnCtxtRprtRtx | Context report message retransmissions |
| ctxtfnCtxtRprtRx | Context report messages received |
| ctxtfnCtxtRprtDrop | Context report messages dropped |
| ctxtfnCtxtRprtAckTx | Context report ack messages transmitted |
| ctxtfnCtxtRprtAckRx | Context report ack messages received |
| ctxtfnCtxtRprtAckDrop | Context report ack messages dropped |
| ctxtfnPkmv2Failure | MS network entry failures due to PKMv2 handshake failure |

**Table 4-35: Performance Data Collected for the DHCP Proxy Functionality**

| Perfomance Data Collected | For the Number of... |
|---|---|
| dhcpDiscoverRx | DHCP discover messages received at DHCP proxy |
| dhcpDiscoverDrop | DHCP discover messages dropped at DHCP proxy |
| dhcpRequestRx | DHCP request messages received at DHCP proxy |
| dhcpRequestDrop | DHCP request messages dropped at DHCP proxy |
| dhcpLeaseTimerExp | DHCP lease timer expiries at DHCP proxy |
| dhcpInvalidEvent | Invalid events occurred due to reception of DHCP messages at DHCP proxy |
| dhcpReleaseRx | DHCP release messages received at DHCP proxy |
| dhcpReleaseDrop | DHCP release messages dropped at DHCP proxy |

**Table 4-36: Performance Data Collected for the DHCP Relay Functionality**

| Perfomance Data Collected | For the Number of... |
|---|---|
| dhcpDiscoverRx | DHCP discover messages received at DHCP relay |

**Table 4-36: Performance Data Collected for the DHCP Relay Functionality**

| | |
|---|---|
| dhcpDiscoverDrop | DHCP discover messages dropped at DHCP relay |
| dhcpOfferRx | DHCP offer messages received at DHCP relay |
| dhcpOfferDrop | DHCP offer messages dropped at DHCP relay |
| dhcpRequestRx | DHCP request messages received at DHCP relay |
| dhcpRequestDrop | DHCP request messages dropped at DHCP relay |
| dhcpAckRx | DHCP Ack messages received at DHCP relay |
| dhcpAckDrop | DHCP Ack messages dropped at DHCP relay |
| dhcpNakRx | DHCP Nack messages received at DHCP relay |
| dhcpNakDrop | DHCP Nack messages dropped at DHCP relay |
| dhcpIpAllocFailed | IP allocation failures at DHCP relay |
| dhcpInvalidEvent | Invalid events occurred due to reception of DHCP messages at DHCP server |

**Table 4-37: Performance Data Collected for the DHCP Server Functionality**

| Perfomance Data Collected | For the Number of... |
|---|---|
| dhcpDiscoverRx | DHCP discover messages received at DHCP server |
| dhcpDiscoverDrop | DHCP discover messages dropped at DHCP server |
| dhcpRequestRx | DHCP request messages received at DHCP server |
| dhcpRequestDrop | DHCP request messages dropped at DHCP server |
| dhcpReleaseRx | DHCP release messages received at DHCP server |
| dhcpReleaseDrop | DHCP release messages dropped at DHCP server |
| dhcpLeaseTimerExp | DHCP lease timer expiries at DHCP server |

**Table 4-37: Performance Data Collected for the DHCP Server Functionality**

| | |
|---|---|
| dhcpInvalidEvent | Invalid events occurred due to reception of DHCP messages at DHCP server |

**Table 4-38: Performance Data Collected for the IGMP Functionality**

| Perfomance Data Collected | For the Number of .... |
|---|---|
| igmpQueryRx | IGMP query messages received |
| igmpReportRx | IGMP report messages received |
| igmpReportTx | IGMP report messages transmitted |
| igmpErrQueryRx | Erroneous IGMP query messages received |
| igmpErrReportRx | Erroneous IGMP report messages received |
| igmpMcastGroups | Active IGMP multicast groups |
| igmpInvalidEvent | Invalid events occurred due to reception of IGMP messages |

**Table 4-39: Performance Data Collected for the MIP Client Functionality**

| Perfomance Data Collected | For the Number of ... |
|---|---|
| mipNumPmipMS | IP address allocations done for PMIP enabled MS |
| mipRRPRx | MIP registration reply messages received at PMIP client |
| mipRRQTx | MIP registration request messages transmitted at PMIP client |
| mipRRQRtx | MIP registration request messages retransmissions at PMIP client |
| mipRRPErr | Erroneous MIP registration report messages received at PMIP client |
| mipMsSoftLifetimeExp | MIP MS lifetime expiries at PMIP client |
| mipIpAllocFailed | MIP IP allocation failures at PMIP client |
| mipIpDeallocFailed | MIP IP deallocation failures at PMIP client |
| mipFaMigFailed | FA migration failures |
| mipInvalidEvent | Invalid events occurred due to reception of MIP messages at PMIP client |

**Table 4-40: Performance Data Collected for the MIP-FA Functionality**

| Perfomance Data Collected | For the Number of ... |
|---|---|

**Table 4-40: Performance Data Collected for the MIP-FA Functionality**

| | |
|---|---|
| mipNumCmipMS | IP address allocations done for CMIP enabled MS |
| mipRRQRx | MIP registration request messages received at FA |
| mipRRPRx | MIP registration reply messages received at FA |
| mipRRQTx | MIP registration request messages transmitted at FA |
| mipRRPTx | MIP registration reply messages transmitted at FA |
| mipRRQErr | Erroneous MIP registration request messages received at FA |
| mipRRPErr | Erroneous MIP registration report messages received at FA |
| mipAgentAdvTx | MIP agent advertisement messages transmitted at FA |
| mipAgentSolRx | MIP agent solicitation request messages received at FA |
| mipMsLifetimeExp | MIP MS Lifetime expiries at FA |
| mipIpAllocFailed | MIP IP allocation failures at FA |
| mipIpDeallocFailed | MIP IP deallocation failures at FA |
| mipInvalidEvent | Invalid events occurred due to reception of MIP messages at FA |

**Table 4-41: Performance Data Collected for the MS State Change Functionality**

| Perfomance Data Collected | For the Number of ... |
|---|---|
| msscfnMsscReqTx | MS state change request messages transmitted |
| msscfnMsscReqRtx | MS state change request message retransmissions |
| msscfnMsscReqRx | MS state change request messages received |
| msscfnMsscReqDrop | MS state change request messages dropped |
| msscfnMsscRspTx | MS state change response messages transmitted |
| msscfnMsscRspRtx | MS state change response message retransmissions |

**Table 4-41: Performance Data Collected for the MS State Change Functionality**

| | |
|---|---|
| msscfnMsscRspRx | MS state change response messages received |
| msscfnMsscRspDrop | MS state change response messages dropped |
| msscfnMsscRspAckTx | MS state change response ack messages transmitted |
| msscfnMsscRspAckRx | MS state change response ack messages received |
| msscfnMsscRspAckDrop | MS state change response ack messages dropped |
| msscfnMsscDrctvTx | MS state change directive messages transmitted |
| msscfnMsscDrctvRtx | MS state change directive message retransmissions |
| msscfnMsscDelDrctvTx | MS state change delete directive messages transmitted |
| msscfnMsscDelDrctvRtx | MS state change delete directive message retransmissions |
| msscfnMsscDelDrctvDrop | MS state change delete directive messages dropped |
| msscfnMsscDelDrctvAckTx | MS state change delete directive ack messages transmitted |
| msscfnMsscDelDrctvAckRx | MS state change delete directive ack messages received |
| msscfnMsscDelDrctvAckDrop | MS state change delete directive ack messages dropped |
| msscfnMsUnsuppSecCap | MS network entry failures due to unsupported security capabilities |
| msscfnMsSecCapMismatch | MS network entry failures due to security capability mismatch |

### 4.3.12.2 Enabling Collection and Storage of Historical Performance Data

4Motion collects and stores performance data for the a number of system groups (refer to Section 4.3.12). To enable collection and storage of performance data for a group, run the following command:

```
npu(config)# group enable {pmNpuBckhlPort | pmNpuMgmtPort |
pmNpuCascPort | pmAuPort | pmNpuIntMgmtIf | pmNpuExtMgmtIf |
```

**pmNpuLclMgmtIf | pmNpuBearerIf | pmSfa | pmDatapathFn | pmAaaClient | pmAuthenticator | pmContextFn | pmDhcpProxy | pmDhcpRelay | pmDhcpServer | pmIgmp | pmMipClient | pmMipFa | pmMsStateChangeFn}**

**NOTE**

Using this command, you can enable collection of performance data for only one group at a time. For example, run the following command if you want to enable performance data collection and storage for the data path function:

```
npu(config)# group enable pmDatapathFn
```

You can display whether performance data collection is currently enabled or disabled for a particular group. For details, refer Section 4.3.12.4.

The parameters in this command correspond to the groups listed in the following table:

**Table 4-42: Groups for which Performance Data is Collected**

| Parameter Name | Refers to... |
|---|---|
| **pmNpuBckhlPort** | NPU DATA port |
| **pmNpuMgmtPort** | NPU MGMT port |
| **pmNpuCascPort** | NPU CASCADE port |
| **pmAuPort** | AU ports |
| **pmNpuIntMgmtIf** | NPU internal-management interface |
| **pmNpuExtMgmtIf** | NPU external-management interface |
| **pmNpuLclMgmtIf** | NPU local-management interface |
| **pmNpuBearerIf** | NPU bearer interface |
| **pmSfa** | Service flow authorization |
| **pmDatapathFn** | Data path functionality |
| **pmAaaClient** | AAA client functionality |
| **pmAuthenticator** | Authenticator function |
| **pmContextFn** | Context function |
| **pmDhcpProxy** | DHCP proxy functionality |
| **pmDhcpRelay** | DHCP relay functionality |
| **pmDhcpServer** | DHCP server functionality |
| **pmIgmp** | IGMP functionality |
| **pmMipClient** | MIP client functionality |

**Table 4-42: Groups for which Performance Data is Collected**

| | |
|---|---|
| **pmMipFa** | MIP-FA functionality |
| **pmMsStateChangeFn** | MS state change functionality |

For example, run the following command if you want to enable performance data collection for the NPU DATA port:

```
npu(config)# group enable pmNpuBckhlPort
```

When you run this command, collection and storage of performance data is enabled for the IGMP functionality.

**NOTE**

When you enable collection of performance data collection, the data is stored in a file called, **prf_yyyymmddhhmm.xml.gz** in the path, **TFTP/boot/Management/Performance Manager**. It is recommended that you periodically make a backup of these files on an external server.

After you have enabled collection and storage of performance data is fetched every quarter of an hour.

**IMPORTANT**

An error may occur if run this command when you are operating the NPU in the Transparent mode and want to enable performance data storage and collection for the following WiMAX signaling protocol groups:

- Service Flow Authorization functionality
- Data path functionality
- AAA client functionality
- Authenticator function
- Context function
- DHCP proxy functionality
- DHCP relay functionality
- DHCP server functionality
- IGMP functionality
- MIP client
- MIP-FA functionality
- MS state change functionality

**Command Syntax**

```
npu(config)# group enable {pmNpuBckhlPort | pmNpuMgmtPort | pmNpuCascPort
| pmAuPort | pmNpuIntMgmtIf | pmNpuExtMgmtIf | pmNpuLclMgmtIf |
pmNpuBearerIf | pmSfa | pmDatapathFn | pmAaaClient | pmAuthenticator |
pmContextFn | pmDhcpProxy | pmDhcpRelay | pmDhcpServer | pmIgmp |
pmMipClient | pmMipFa | pmMsStateChangeFn}
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {pmNpuBckhlPort\|pmNpuMgmtPort\|pmNpuCascPort\|pmAuPort \| pmNpuIntMgmtIf pmNpuExtMgmtIf \|pmNpuLclMgmtIf\|pmNpuBearerIf\|pmSfa\|pmDatapathFn\|pmAaaClient\|pmAuthenticator\|pmContextFn\|pmDhcpProxy\|pmDhcpRelay\|pmDhcpServer\|pmIgmp\|pmMipClient\|pmMipFa\|pmMsStateChangeFn} | For a description of each parameter in this command, refer Table 4-42. | Mandatory | N/A | Refer Table 4-42. |

**Command Modes**

Global configuration mode

### 4.3.12.3 Disabling Collection and Storage of Performance Data

To disable collection and storage of performance data for one or all groups, run the following command:

**npu(config)# no group enable {pmNpuBckhlPort | pmNpuMgmtPort | pmNpuCascPort | pmAuPort | pmNpuIntMgmtIf | pmNpuExtMgmtIf | pmNpuLclMgmtIf | pmNpuBearerIf | pmSfa | pmDatapathFn | pmAaaClient | pmAuthenticator | pmContextFn | pmDhcpProxy | pmDhcpRelay | pmDhcpServer | pmIgmp | pmMipClient | pmMipFa | pmMsStateChangeFn}**

**NOTE**

Using this command, you can disable collection of performance data for only one group at a time. For more information about the group names in this command, refer to Table 4-42.

For example, run the following command if you want to disable performance data collection and storage for the data path function:

**npu(config)# no group enable pmDatapathFn**

**Command Syntax**

**npu(config)# no group enable {pmNpuBckhlPort | pmNpuMgmtPort | pmNpuCascPort | pmAuPort | pmNpuIntMgmtIf | pmNpuExtMgmtIf | pmNpuLclMgmtIf | pmNpuBearerIf | pmSfa | pmDatapathFn | pmAaaClient | pmAuthenticator | pmContextFn | pmDhcpProxy | pmDhcpRelay | pmDhcpServer | pmIgmp | pmMipClient | pmMipFa | pmMsStateChangeFn}**

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {pmNpuBckhlPort\|pmNpuMgmtPort\|pmNpuCascPort\|pmAuPort \| pmNpuIntMgmtIf pmNpuExtMgmtIf \|pmNpuLclMgmtIf\|pmNpuBearerIf\|pmSfa\|pmDatapathFn\|pmAaaClient\|pmAuthenticator\|pmContextFn\|pmDhcpProxy\|pmDhcpRelay\|pmDhcpServer\|pmIgmp\|pmMipClient\|pmMipFa\|pmMsStateChangeFn} | For a description of each parameter in this command, refer Table 4-42. | Mandatory | N/A | Refer Table 4-42 |

**Command Modes**

Global configuration mode

## 4.3.12.4 Displaying the Status of Performance Data Collection

To display whether collection and storage of performance data is enabled/disabled for a group, run the following command:

**npu# show group status {pmNpuBckhlPort | pmNpuMgmtPort | pmNpuCascPort | pmAuPort | pmNpuIntMgmtIf | pmNpuExtMgmtIf | pmNpuLclMgmtIf | pmNpuBearerIf | pmSfa | pmDatapathFn | pmAaaClient | pmAuthenticator | pmContextFn | pmDhcpProxy | pmDhcpRelay | pmDhcpServer | pmIgmp | pmMipClient | pmMipFa | pmMsStateChangeFn}**

**IMPORTANT**

An error may occur if run this command when you are operating the NPU in the Transparent mode and want to display performance data collection for the following WiMAX signaling protocol groups:

- Service Flow Authorization functionality
- Data path functionality
- AAA client functionality
- Authenticator function
- Context function
- DHCP proxy functionality
- DHCP relay functionality
- DHCP server functionality
- IGMP functionality
- MIP client
- MIP-FA functionality
- MS state change functionality

**Command Syntax**

```
npu# show group status {pmNpuBckhlPort | pmNpuMgmtPort | pmNpuCascPort |
pmAuPort | pmNpuIntMgmtIf | pmNpuExtMgmtIf | pmNpuLclMgmtIf |
pmNpuBearerIf | pmSfa | pmDatapathFn | pmAaaClient | pmAuthenticator |
pmContextFn | pmDhcpProxy | pmDhcpRelay | pmDhcpServer | pmIgmp |
pmMipClient | pmMipFa | pmMsStateChangeFn}
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {pmNpuBckhlPort\|pmNpuMgmtPort\|pmNpuCascPort\|pmAuPort \| pmNpuIntMgmtIf pmNpuExtMgmtIf \|pmNpuLclMgmtIf\|pmNpuBearerIf\|pmSfa\|pmDatapathFn\|pmAaaClient\|pmAuthenticator\|pmContextFn\|pmDhcpProxy\|pmDhcpRelay\|pmDhcpServer\|pmIgmp\|pmMipClient\|pmMipFa\|pmMsStateChangeFn} | For a description of each parameter in this command, refer Table 4-42. | Mandatory | N/A | Refer Table 4-42 |

**Display Format**

```
Group Name    Status
<Group Name>   <Status>
```

**Command Modes**

Global command mode

## 4.3.13 Configuring the SNMP/Trap Manager

This section describes the commands for:

- “Configuring the SNMP Manager” on page 405
- “Configuring the Trap Manager” on page 408

### 4.3.13.1 Configuring the SNMP Manager

To enable 4Motion configuration over SNMP, you are required to first configure the SNMP Manager. You can configure upto five SNMP Managers for the 4Motion system. This section describes the commands to be executed for:

- “Adding an SNMP Manager” on page 406

- "Deleting an Entry for the SNMP Manager" on page 407
- "Displaying Configuration Information for SNMP Managers" on page 407


#### 4.3.13.1.1 Adding an SNMP Manager

You can configure upto five SNMP Managers. To add an SNMP Manager, run the following command:

**npu(config)# snmp-mgr** [**ReadCommunity** <string>] [**ReadWriteCommunity** <string>]

You can display configuration information for existing SNMP Managers. For details, refer Section 4.3.13.1.3.

**IMPORTANT**

An error may occur if you have specified:

- More than five entries for the SNMP Manager
- Duplicate entries

**Command Syntax** **npu(config)# snmp-mgr** [**ReadCommunity** <string>] [**ReadWriteCommunity** <string>]

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [ReadCommunity <string>] | Indicates the name of the community of the SNMP Manager. Only SNMP Managers for which this parameter is configured are permitted to execute the Get operations. | Optional | public | String (upto 10 characters and case-sensitive) |

| | | | | | |
|---|---|---|---|---|---|
| | [ReadWriteCommunity <string>] | Indicates the name of the community of the SNMP Manager. Only SNMP Managers for which this parameter is configured are permitted to execute the Get and Set operations. | Optional | private | String (upto 10 characters and case-sensitive) |

**Command Modes** Global configuration mode

### 4.3.13.1.2 Deleting an Entry for the SNMP Manager

To delete an SNMP Manager entry from the SNMP Manager index, run the following command:

```
npu(config)# no snmp-mgr index <integer(1-5 )>
```

**IMPORTANT**

An error may occur if you provide an incorrect index number for the SNMP Manager to be deleted. To display the index numbers for configured SNMP Managers, refer Section 4.3.13.1.3.

**Command Syntax**

```
npu(config)# no snmp-mgr index <integer(1-5 )>
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <integer(1-5 )> | Indicates the index number of the SNMP Manager to be deleted. | Mandatory | N/A | 1-5 |

**Command Modes** Global configuration mode

### 4.3.13.1.3 Displaying Configuration Information for SNMP Managers

To display configuration information for all SNMP Managers, run the following command:

```
npu# show snmp-mgr
```

**IMPORTANT**

An error may occur if there is no existing SMNP Manager entry.

| | |
|---|---|
| **Command Syntax** | `npu# show snmp-mgr` |
| **Privilege Level** | 1 |
| **Display Format** | `Snmp Manager Table`<br>`------------------------------`<br>`Manager Index:(1) Read Only Community:(<value>) ReadWriteCommunity: (<value>)` |
| **Command Modes** | Global command mode |

### 4.3.13.2 Configuring the Trap Manager

The SNMP Agent can send traps to multiple Trap Managers, for which an entry exists in the 4Motion system. After you have created an entry for a Trap Manager, you are required to enable the Trap Manager. You can, at any time, disable a Trap Manager for the 4Motion system.

This section describes the commands for:


- "Adding a Trap Manager entry" on page 409
- "Deleting an Entry for the Trap Manager" on page 410
- "Enabling/Disabling the Trap Manager" on page 411
- "Displaying Configuration Information for Trap Managers" on page 412
- "Displaying the Trap Rate Limit" on page 412

### 4.3.13.2.1 Adding a Trap Manager entry

You can configure upto five Trap Manager entries for the 4Motion system. To add Trap Manager entry, run the following command:

```
npu(config)# trap-mgr ip-source <ip_addr> [Mask <ip_mask>] [Port
<integer(0-255)>] [TrapCommunity <string>] [EnableFlag
<integer(1-2)>]
```

You can view configuration information for existing Trap Managers. For details, refer Section 4.3.13.2.4.

**IMPORTANT**

An error may occur if :

- You have specified invalid values for the IP address, address mask or port.
- The IP address, address mask or port are already configured for another Trap Manager.
- You are trying to create more than five Trap Managers. (You can configure upto five Trap Managers for the 4Motion system.

**Command Syntax**

```
npu(config)# trap-mgr ip-source <ip_addr> [Mask <ip_mask>] [Port
<integer(0-255)>] [TrapCommunity <string>] [EnableFlag <integer(1-2)>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ip_addr> | Indicates the IP address of the Trap Manager to be added or modified. | Mandatory | N/A | Valid IP address |
| [Mask <ip_mask>] | Indicates the address mask for the Trap Manager to be added. | Optional | 0.0.0.0 | Valid address mask |
| [Port <integer(0-255)>] | Indicates the port number on which the Trap Manager will listen for messages from the Agent. | Optional | 162 | 0-255 |

| | | | | | |
|---|---|---|---|---|---|
| | [TrapCommunity <string>] | Indicates the name of the community of the Trap Manager. Only Trap Managers for which this parameter is configured are permitted to execute the Get and Set operations | Optional | public | String (upto 10 characters and case-sensitive) |
| | [EnableFlag<integer(1-2)>] | Indicates whether the Trap Manager being added is to be enabled. | Optional | 1 | ■ 1: Indicates enable<br>■ 2 Indicates disable |

**Command Modes** Global configuration mode

### 4.3.13.2.2 Deleting an Entry for the Trap Manager

To delete a Trap Manager, run the following command:

**npu(config)# no trap-mgr ip-source** <ip_addr>

You can delete an entry for a Trap Manager only if the Trap Manager is disabled for a particular SNMP Manager. For more information about disabling the Trap Manager, refer to "Enabling/Disabling the Trap Manager" on page 411.

**IMPORTANT**

An error may occur if the IP address you have specifed does not exist.

**Command Syntax** **npu(config)# no trap-mgr ip-source** <ip_addr>

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ip_addr> | Indicates the IP address of the Trap Manager to be deleted. | Mandatory | N/A | Valid IP address |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

### 4.3.13.2.3 Enabling/Disabling the Trap Manager

Traps are sent to a particular Trap Manager only if it is enabled. Run the following commands to enable/disable the Trap Manager that you have created.

**NOTE**

By default, Trap Managers are enabled.

By default, all Trap Managers are disabled.

```
npu(config)# trap-mgr enable ip-source <ip_addr>
```

```
npu (config)# trap-mgr disable ip-source <ip_addr>
```

**IMPORTANT**

An error may occur if the IP address that you ave specified does not exist in the Trap Manager index.

| | |
|---|---|
| **Command Syntax** | **npu(config)# trap-mgr enable ip-source** <ip_addr><br>**npu (config)# trap-mgr disable ip-source** <ip_addr> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <ip_addr> | Indicates the IP address of the Trap Manager to be enabled/disabled. | Mandatory | N/A | Valid IP Address |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

### 4.3.13.2.4 Displaying Configuration Information for Trap Managers

To display configuration information for the configured Trap Managers, run the following command:

```
npu# show trap-mgr
```

**IMPORTANT**

An error may occur if no Trap Manager has been configured.

**Command Syntax**

```
npu# show trap-mgr
```

**Privilege Level**

1

**Display Format**

```
                  Trap Manager Table
              --------------------------------

Trap Manager Ip:(10.203.153.149) Mask:(0.0.0.0) Port:(162)
Community:(public)  Control Register: (Enable)
```

**Command Modes**

Global command mode

### 4.3.13.2.5 Displaying the Trap Rate Limit

To display the trap rate limit, run the following command:

```
npu# show trap-rate-limit
```

**IMPORTANT**

The maximum number of traps that can be sent sent per second are 20.

**Command Syntax**

```
npu# show trap-rate-limit
```

**Privilege Level**

1

| | |
|---|---|
| **Display Format** | `Maximum number of traps sent is 20 traps per second.` |
| **Command Modes** | Global command mode |

## 4.3.14 Configuring the 4Motion Shelf

The 4Motion shelf comprises the following components:

- NPU card: Serves as the shelf controller that manages and monitors all the shelf components. In addition, it provides backbone Ethernet connectivity via a 10/100/1000 Base-T network interface. The shelf contains one active and one redundant NPU card.

**IMPORTANT**

NPU redundancy is not supported in the current release.

- AU: Is responsible for wireless network connection establishment and for bandwidth management. The shelf contains six active and one redundant AU.
- PSU: Accepts 48V DC input and provides 5, 3.3, +/-12V DC output. There are four PSUs in the shelf and work in load-sharing mode.
- PIU: Serves as a 48V power source for PSU. One active and one redundant PIU are provided in the shelf.
- GPS: Synchronizes the air link frames of Intra-site and Inter-site located sectors to ensure that in all sectors the air frame will start at the same time, and that all sectors will switch from transmit (downlink) to receive (uplink) at the same time. In addition, the GPS synchronizes frame numbers that are transmitted by the AU.
- AVU: Includes a 1U high integral chamber for inlet airflow and a 1U high fan tray with an internal alarm module. The AVU comprises 10 brush-less fans, where 9 fans are sufficient for cooling a fully loaded chassis.

This section describes the commands to be used for:

- “Configuring the PSU/PIU Modules” on page 414

- "Configuring the GPS" on page 417
- "Managing Dry-contact Input Alarms" on page 431
- "Managing Dry-contact Output Alarms" on page 436
- "Configuring the Location Information for the 4Motion Shelf" on page 441
- "Configuring the Unique Identifier for the 4Motion Shelf" on page 443


## 4.3.14.1 Configuring the PSU/PIU Modules

This section describes the commands to be used for:


- "Enabling/Disabling the PSU, and PIU Modules" on page 414
- "Configuring the PIU Hardware Version" on page 416


### 4.3.14.1.1 Enabling/Disabling the PSU, and PIU Modules

You can use the CLI to configure the administrative status of the PSU/PIU modules to enable or disable.

**IMPORTANT**

An alarm is raised if you enable a PSU or PIU that is already powered down, or you disable a PSU or PIU that is already powered up.

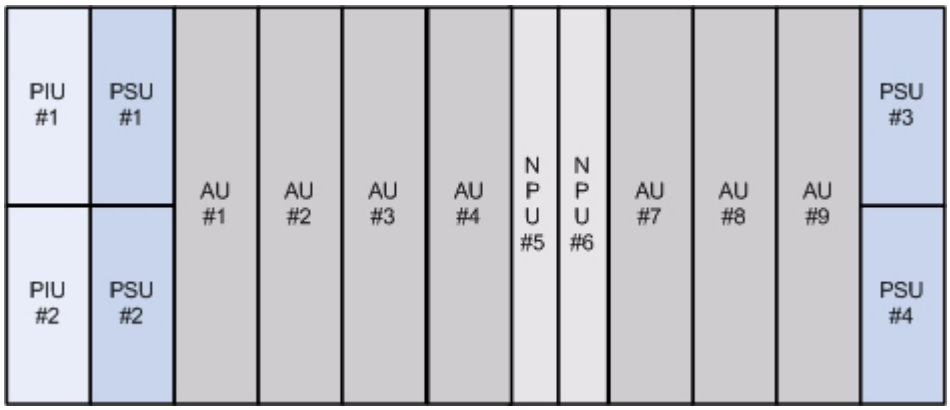
Run the following command to enable/disable the PSU/PIU modules:

```
npu(config)# enable {PSU | PIU} <slot id>
```

```
npu(config)# disable {PSU | PIU} <slot id>
```

Specify the slot ID of the PSU or PIU to be enabled. The following figure depicts the slot ID of the 4Motion shelf components:

**Figure 4-1: Slot IDs of Shelf Components**




For example, if you want to enable PSU, slot# 3, and disable the PIU, slot# 1, run the following command:

```
npu(config)# enable PSU 3

npu(config)# disable PIU 1
```

**IMPORTANT**

An error may occur if you specify a PSU slot ID that is not in the range, 1-4, or a PIU slot ID that is not in the range 1-2.

Remember that a minimum AU-to-PSU/PIU ratio should always be maintained. The following table lists the required active AU-to-PSU ratio. Before disabling the PSU module, ensure that this ratio is maintained.

**IMPORTANT**

Ensure that the NPU to PSU/PIU ratio is also maintained. At least one PSU and PIU should always be active to support the NPU.

**Table 4-43: Active AU-to-PSU Ratio**

| If the number of Active AUs is... | Number of active PSUs should be... | Number of Active PIU |
|---|---|---|
| 1-4 | 2 | 1 |
| 5-7 | 3 | 1 |

**Command Syntax**

```
npu(config)# enable {PSU | PIU} <slot id>
npu(config)# disable {PSU | PIU} <slot id>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {PSU \| PIU} | Indicates whether the PSU or PIU slot is to be enabled or disabled. | Mandatory | N/A | ■ PSU<br>■ PIU |
| <slot id> | Indicates the slot ID of the PSU/PIU that you want to enable or disable. Refer Figure 4-1 for more information about the slot ID assigned to each PIU/PSU module on the 4Motion chassis. | Mandatory | N/A | ■ 1-4 for PSU slot<br>■ 1-2 for PIU slot |

**Command Modes**

Global configuration mode

### 4.3.14.1.2 Configuring the PIU Hardware Version

You need to manually configure the PIU hardware version that is currently in use. The system periodically checks whether the configured and actual hardware versions are identical. If there is a difference in the configured and actual versions, an alarm is raised.

To configure the PIU hardware version, run the following command:

```
npu(config)# PIU <slot id (1-2)> hw_version <version (0-7)>
```

**Command Syntax**

```
npu(config)# PIU <slot id (1-2)> hw_version <version (0-7)>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<slot id (1-2)>` | Indicates the PIU slot ID for which the hardware version is to be configured. | Mandatory | N/A | 1-2 |
| `hw_version <version (0-7)>` | Indicates the hardware version to be configured for the PIU slot. | Mandatory | N/A | 0-7 |

**Command Modes**

Global configuration mode

## 4.3.14.2 Configuring the GPS

The GPS is used to synchronize the air link frames of Intra-site and Inter-site located sectors to ensure that in all sectors the air frame will start at the same time, and that all sectors will switch from transmit (downlink) to receive (uplink) at the same time. This synchronization is necessary to prevent Intra-site and Inter-site sectors interference. In addition, the GPS synchronizes frame numbers that are transmitted by the AU.

**IMPORTANT**

Implementation of GPS synchronization is based on the assumption that all sectors are operating with the same frame size and with the same DL/UL ratio.

The GPS clock generates a 1PPS signal with accuracy of $10^{-11}$ and maximum jitter of 100ns, and is connected to the 4Motion shelf via the GPS SYNC IN connector on the front panel of the NPU. The GPS clock requirements can be reached by an outdoor installed GPS unit when it is synchronized to a minimum number of (user-configurable) satellites.

This section describes the commands to be used for:


- "Configuring the GPS Clocks" on page 418
- "Configuring General Configuration Parameters for the GPS" on page 420
- "Configuring the Date and Time" on page 422
- "Configuring the Position" on page 424

- "Configuring the Clock Mode" on page 425
- "Configuring the Required Number of Satellites" on page 426
- "Displaying GPS Clocks Parameters" on page 427
- "Displaying GPS General Configuration Parameters" on page 428
- "Displaying the Date and Time Parameters" on page 429
- "Displaying the Position Parameters" on page 430
- "Displaying the Clock Mode Parameter" on page 430
- "Displaying the Number of Satellite Parameters" on page 431


#### 4.3.14.2.1 Configuring the GPS Clocks

The GPS clock parameters determines the source for the main clocks in the system. To configure the GPS clock, you are required to enable/disable:

**IMPORTANT**

Reset the system for changes in the GPS clock configuration to be applied to the entire system.

- External 1PPS: Determines the air-frame start time. Assuming that all systems use the same air-frame size and DL/UL Ratio, then, when the 1PPS clock is received from a GPS system, this mechanism ensures inter-site and intra-site synchronization among all sectors, preventing cross interference and saturation problems. When using the internal 1PPS clock (derived from the selected 16 MHz clock source), only intra-site synchronization among sectors can be achieved. You can either enable the external 1PPS clock source or use the internal 1PPS clock source derived from the selected 16 MHz clock. By default, the External IPPS clock is enabled.

**NOTE**

If the external 1PPS GPS clock is enabled:

- The concatenated slave NPU 16Mhz created from local 16MHz TCXO/OCXO at the NPU provides holdover when the GPS loses synchronization with its satellites.
- Configure the GPS parameters listed in section, Section 4.3.14.2.2.

- External 16MHz: Generates all the main clocking signals in the system, including the internal 1PPS clock. Using an external, accurate 16 MHz clock source will enable better hold-over of the 1PPS clock upon temporary loss (or reduced reliability when receiving less than 4 satellites) of the external 1PPS clock. This will allow a longer time of continued operation before appearance of interferences due to clock drifts among BSs. You can either enable the external 16 MHz clock source or use the internal 16 MHz clock source. By default, the external 16MHz clock is disabled.

To configure the GPS clock, run the following command:

**npu(config)# set clock ([ External1PPS {Enable | Disable} ] [ External16MHz {Enable | Disable} ])**

For example, to configure the internal 1PPS clock at the NPU to synchronize the air frames for inter-site and intra-site sectors:

**npu(config)# set clock External1PPS Disable**

| | |
|---|---|
| **Command Syntax** | **npu(config)# set clock ([ External1PPS {Enable \| Disable} ] [ External16MHz {Enable \| Disable} ])** |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `External1PPS {Enable \| Disable}` | Indicates whether the external 1PPS clock is enabled or disabled.<br><br>If the External 1PPs clock is enabled, synchronization of air frames for inter-site and intra-site sectors should be managed by the external 1PPS GPS clock. If the External 1PPS clock is disabled, it indicates that the internal 1PPS at the NPU is used to synchronize air frames for inter-site and intra-site sectors.<br><br>. | Optional | Enable | ■ Enable<br>■ Disable |
| `External16MHz {Enable \| Disable}` | Indicates whether the External 16Mhz clock is enabled or disabled.<br><br>If the external 16 MHz is enabled, the NPU should receive 16Mhz signal from the master NPU. This parameter should be enabled only if the NPU clock mode is slave. If the NPU clock mode is master, the MPU drives the 16Mhz signal towards the slave NPUs | Optional | Disable | ■ Enable<br>■ Disable |

**Command Modes**

Global configuration mode

### 4.3.14.2.2 Configuring General Configuration Parameters for the GPS

**IMPORTANT**

Skip this section if you have selected the internal 1PPS clock. For more information about configuring the GPS clock, refer Section 4.3.14.2.1.

The GPS general configuration parameters determine how the GPS should function with respect to the 4Motion system. Depending upon the values defined for these parameters, you can configure the GPS clock (external 1PPS and 16MHz), and the UTC time. Run the following command to configure the global configuration parameters for the GPS:

**npu(config)# gps config** ( [**Type** {**Trimble | None**}] [**AdaptorRequired** {**Yes | No**}][**HoldoverPassedTout** <expiry_interval(0-2880)>] [**HoldoverPassTxOperationStop** {**True | False**}][**AlmanacUsableTime** <expiry_interval(0-4320)>] [**EphemerisUsableTime** <expiry_interval(0-168)>] [**IntervalToReadGPSTime**{**Hourly | Daily | Monthly | Yearly**}] [**TimeToReadGPSTime** <HH:MM:SS,DD/MM>]))

**IMPORTANT**

An error may occur if:

TIme to read GPS time is not in valid format. Correct format is hh:mm:ss, dd/mm: Minute and Second should be within range of 0 to 60, Hour should be within the range of 0 to 24, days should be in the range 1 to 31 and Month should be within the range of 1 to 12, also day should be valid in accodance with month.

**Command Syntax**

**npu(config)# gps config gps config** ( [**Type** {**Trimble | None**}] [**AdaptorRequired** {**Yes | No**}][**HoldoverPassedTout** <expiry_interval(0-2880)>] [**HoldoverPassTxOperationStop** {**True | False**}][**AlmanacUsableTime** <expiry_interval(0-4320)>] [**EphemerisUsableTime** <expiry_interval(0-168)>] [**IntervalToReadGPSTime**{**Hourly | Daily | Monthly | Yearly**}] [**TimeToReadGPSTime** <HH:MM:SS,DD/MM>]))

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| Type {Trimble \| None}] | Indicates the type of GPS connected to 4Motion. | Optional | Trimble | ■ Trimble<br>■ None |

| | | | | |
|---|---|---|---|---|
| [AdaptorRequired {Yes \| No}] | Indicates whether a GPS adaptor is required. The NPU can be connected to an extenal GPS adaptor that allows the NPU to connect to multiple GPS interfaces/1PPS /16Mhz clocks. | Optional | No | ■ Yes<br>■ No |
| [HoldoverTimeout <expiry_interval (0-2880)>] | Indicates the period, in minutes, for which the NPU provides holdover when the GPS loses synchronization with its satellites. | Optional | 480 | 0 - 2880 |
| [HoldoverPassTxOperationStop {True \| False}] | Indicates whether the AU modules should stop data transmission if the GPS loses synchronization with its satellites and the holdover timeout has occurred. | Optional | True | ■ True<br>■ False |
| [AlmanacUsableTime <expiry-interval(0-4320)>] | Indicates the maximum period, in hours, for which the Almanac time is valid when the GPS is reset. | Optional | 720 | 0-4320 |
| [EphemerisUsableTime <expiry-interval(0-168)>] | Indicates the maximum period, in hours, for which the Ephemeris time is valid when the GPS is reset. | Optional | 4 | 0-168 |
| [IntervalToReadGPSTime {Hourly \| Daily \| Monthly \| Yearly}] | Indicates the interval after which the NPU should obtain the GPS time for frame synchronization, and send it to the AU. | Optional | Daily | ■ Hourly<br>■ Daily<br>■ Monthly<br>■ Yearly |
| [TimeToReadGPSTime <HH:MM:SS,DD/MM>] | Indicates the time when the NPU should obtain the GPS time for frame synchronization. . | Optional | 04:05 | HH:MM:SS,DD/MM |

**Command Modes** Global configuration mode

### 4.3.14.2.3 Configuring the Date and Time

The UTC time is used to configure the following:

- Local time: Differs from the UTC time with respect to the value you have specified for the `localUTCDiff` and DST parameters. The local time is equal to the sum of the UTC time, the value of the `localUTCDiff` parameter (local offset from UTC time) and DST (daylight saving time offset). For more information about configuring this parameter, "Configuring the GPS Clocks" on page 418. You can use the CLI to display the current local time. For details, refer the section, "Displaying the Date and Time Parameters" on page 429.

- System time: Refers to the operating system (kernel) time that is identical to the UTC time when the system boots up. The system time is updated every hour with the time received from the GPS receiver.

- Real Time Clock (RTC) time: Refers to the time maintained by the board's hardware clock. By default, the RTC time is set to 1st January, 1970. The RTC time is updated every hour with the UTC time that is received from the GPS receiver or that you have configured from the CLI. The RTC time is used for creating the timestamp for log and trace messages, performance data collection files, and for managing the interval after which a backup of the configuration file should be maintained and performance data should be collected.

Execute the following command to configure the date and time parameters. If the GPS is synchronized to its satellites and is connected to 4Motion, the UTC time is provided by the GPS. Otherwise the UTC time that you configure is used instead.

To configure the date and time parameters, run the following command:

```
npu(config)# set date [UTC <HH:MM:SS,DD/MM/YYYY>] [LocalUTCDiff
<+/-HH:MM>] [DST <(0-2)>]
```

**IMPORTANT**

An error may occur if :
1) UTC time is not in the valid format i.e. hh: mm: ss, dd/mm/yyyy.
2) Local UTCDiff is not valid format i.e. +/-hh:mm
3) Local UTC Diff is out of the range between -12 to +13 or it is not in steps of 30 minutes.
4) DST is out of range i.e between 0 to 2

| | |
|---|---|
| **Command Syntax** | `npu(config)# set date [UTC <HH:MM:SS,DD/MM/YYYY>] [LocalUTCDiff <+/-HH:MM>] [DST <(0-2)>]` |

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| UTC <HH:MM:SS,DD/MM/YYYY> | Indicates the UTC time to be used for 4Motion if not available from GPS. | Mandatory | N/A | Use the format:<br>HH:MM: SS, DD/MM/YYYY |
| LocalUTCDiff <+/-HH:MM> | The local offset from UTC | Optional | +02:00 | +/-HH:MM<br>HH: -12 to +13<br>MM: 00or 30 |
| `DST <(0-2)>` | Daylight Saving Time offset of the local clock | Optional | 0 | 0-2 |

**Command Modes** Global configuration mode

### 4.3.14.2.4 Configuring the Position

The position configuration enables setting the location's parameters when GPS is not used (Type=None).

To configure the position parameters, run the following command:

```
npu(config)# set position ([Latitude <xxx.xxx,N/S>] [Longitude
<xxx.xxx,E/W>] [Altitude (-300.0 - 9000.0)])
```

**IMPORTANT**

An error may occur if :
1) Latitude, longitude and altitude are configured while GPS type is not "None".
2) Latitude is not in valid format i.e. lll.mmm,a where a is either N or S
3) Longitude is not in valid format i.e. lll.mmm,a where a is either E or W.
4) Altitude is not in valid range i.e. +-300.0 to 9000.0.

**Command Syntax**

```
npu(config)# set position ([Latitude <xxx.xxx,N/S>] [Longitude
<xxx.xxx,E/W>] [Altitude (-300.0 - 9000.0)])
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| Latitude <xxx.xxx,N/S> | Indicates the latitude where the 4Motion shelf is currently positioned. Configure only if GPS Type is None. | Optional | 000.000.N | Use the format, lll.mmm.a (where the value of a is either N or S) |
| Longitude <xxx.xxx,E/W> | Indicates the longitude where the 4Motion shelf is currently positioned. Configure only if GPS Type is None. | Optional | 000.000.E | Use the format, lll.mmm.a (where the value of a is either E or W) |
| `Altitude (-300.0 - 9000.0)])` | Indicates the altitude (in meters) where the 4Motion shelf is currently positioned. Configure only if GPS Type is None. | Optional | 0.0 | -300.0 to 9000.0 |

**Command Modes**

Global configuration mode

### 4.3.14.2.5 Configuring the Clock Mode

The Clock Mode parameter enables defining the functionality of the NPU when GPS chaining is used. In the current release GPS chaining is not supported and the clock mode must be set to Master.

To configure the clock mode parameter, run the following command:

```
npu(config)# set npu ClockMode {Master | Redundant | Slave}
```

**IMPORTANT**

An error may occur if setting to any option other than Master because current release supports only the Master option.

**Command Syntax**

```
npu(config)# set npu ClockMode {Master | Redundant | Slave}
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| npu ClockMode {Master \| Redundant \| Slave} | Indicates the clocks functionality of the NPU when GPS chaining is used. GPS chaining is not supportyed in current release and this parameter must be set to its default value of Master. | Optional | Master | Master<br>(other options not supported in current release) |

**Command Modes** Global configuration mode

### 4.3.14.2.6 Configuring the Required Number of Satellites

The satellite parameter enables configured the minimum number of satellites required for maintaining synchronization and for renewing synchronization after synchronization loss.

To configure the satellite parameters, run the following command:

```
npu(config)# set satellite ([MinNumOfSatForHoldoverReturn <range (1-12)>] [MaxNumOfSatBeforeSyncLoss <range (0-11)>])
```

**IMPORTANT**

1) An error can occur while configuring MinNumOfSatForHoldoverReturn if Minimum number of satellite for holdover return is less than Maximum number of satellite before synchronization loss.

2) An error can occur while configuring MaxNumOfSatBeforeSyncLoss ifMaximum number of satellite before synchronization is more than Minimum number of satellite for holdover return.

**Command Syntax**

```
npu(config)# set satellite ([MinNumOfSatForHoldoverReturn <range (1-12)>] [MaxNumOfSatBeforeSyncLoss <range (0-11)>]
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| MinNumOfSatForHoldoverReturn <range (1-12)> | Indicates the minimum number of satellites that should be received for resuming synchronization (exiting holdover status) after loss of synchronization. | Optional | 2 | 1-12 |
| `MaxNumOfSatBeforeSyncLoss <range (0-11)>` | Indicates the minimum number of satellites required for maintaining synchronization. | Optional | 1 | 0-11 |

**Command Modes**

Global configuration mode

### 4.3.14.2.7 Displaying GPS Clocks Parameters

To display the GPS clock configuration parameters, run the following command:

```
npu# show clock status [{CurrentExternal1PPS |
ConfiguredExternal1PPS | CurrentExtrnal16MHz |
ConfiguredExternal16MHz}]
```

**Command Syntax**

```
npu# show clock status [{CurrentExternal1PPS |
ConfiguredExternal1PPS | CurrentExtrnal16MHz |
ConfiguredExternal16MHz}
```

**Privilege Level**

1

**Syntax Description**

For a detailed description of each parameter in this command, refer the section, “Configuring the GPS Clocks” on page 418.

Both Current and Configured values for each clock are provided (the parameters are applied after reset)

| | |
|---|---|
| **Display Format** | `Configured External 1PPS Status :Enable/ Disable`<br>`Current External 1PPS Status :Enable/ Disable`<br>`Configured External 16MHz Status :Enable/ Disable`<br>`Current External 16MHz Status :Enable/ Disable` |
| **Command Modes** | Global command mode |

### 4.3.14.2.8 Displaying GPS General Configuration Parameters

To display the GPS general configuration parameters, run the following command:

**`npu# show gps config [{ Type | SoftwareVersion [{ Navigation | Signal }] | AdaptorRequired | HoldoverPassedTout | HoldoverPassTxOperationStop | AlmanacUsableTime | EphemerisUsableTime | IntervalToReadGPSTime | TimeToReadGPSTime} ]`**

| | |
|---|---|
| **Command Syntax** | **`npu# show gps config [{ Type | SoftwareVersion [{ Navigation | Signal }] | AdaptorRequired | HoldoverPassedTout | HoldoverPassTxOperationStop | AlmanacUsableTime | EphemerisUsableTime | IntervalToReadGPSTime | TimeToReadGPSTime} ]`** |
| **Privilege Level** | 1 |
| **Syntax Description** | For a detailed description of each parameter in this command, refer the section, “Configuring General Configuration Parameters for the GPS” on page 420. |

**Display Format**

```
Configured GPS Type                  :
GPS Navigation Processor SW Version  :
GPS Signal Processor SW version      :
Adaptor Required                     :
Holdover Timeout                     :
HoldoverPassedTxOperationStop        :
Almanac Usable Time                  :
Ephemeris Usable Time                :
Interval To Read Gps Time            :
Time To Read Gps Time                :
```

**Command Modes**

Global command mode

In addition to the configuration parameters, the SW Versions of the GPS Navigation and Signal Processors are also displayed (if available).

### 4.3.14.2.9 Displaying the Date and Time Parameters

To display the current date parameters, run the following command:

```
npu# show date [{ Local | UTC | LocalUTCDiff | DST }]
```

**Command Syntax**

```
npu# show date [{ Local | UTC | LocalUTCDiff | DST }]
```

**Privilege Level**

1

**Syntax Description**

For a detailed description of each parameter in this command, refer the section, “Configuring the Date and Time” on page 422.

**Display Format**

```
Local Time           :
UTC Time             :
Local UTC Offset     :
Daylight Saving Time :
```

| | |
|---|---|
| **Command Modes** | Global command mode |

In addition to the configurable parameters, the calculated Local Time is also displayed.

#### 4.3.14.2.10 Displaying the Position Parameters

To display the current position parameters, run the following command:

```
npu# show position [{ Latitude | Longitude | Altitude }]
```

| | |
|---|---|
| **Command Syntax** | `npu# show position [{ Latitude \| Longitude \| Altitude }]` |
| **Privilege Level** | 1 |
| **Syntax Description** | For a detailed description of each parameter in this command, refer the section, "Configuring the Position" on page 424. |
| **Display Format** | `Latitude :`<br>`Longitude :`<br>`Altitude :` |
| **Command Modes** | Global command mode |

#### 4.3.14.2.11 Displaying the Clock Mode Parameter

To display the current clock mode parameter, run the following command:

```
npu# show npu clock mode
```

| | |
|---|---|
| **Command Syntax** | `npu# show npu clock mode` |
| **Privilege Level** | 1 |

| | |
|---|---|
| **Syntax Description** | For a detailed description of the parameter in this command, refer the section, "Configuring the Clock Mode" on page 425. |
| **Display Format** | `NPU Clock Mode    : Master` |
| **Command Modes** | Global command mode |

#### 4.3.14.2.12 Displaying the Number of Satellite Parameters

To display the current satellite parameters, run the following command:

**`npu# show satellite [{MinNumOfSatForHoldoverReturn | MaxNumOfSatBeforeSyncLoss | NumOfSatelliteAvailable}]`**

| | |
|---|---|
| **Command Syntax** | **`npu#  show satellite [{MinNumOfSatForHoldoverReturn | MaxNumOfSatBeforeSyncLoss | NumOfSatelliteAvailable}]`** |
| **Privilege Level** | 1 |
| **Syntax Description** | For a detailed description of each parameter in this command, refer the section, "Configuring the Required Number of Satellites" on page 426. |
| **Display Format** | `Max Satellites Before Sync Loss      :`<br>`Min Satellites For Holdover Return   :`<br>`Number of Satellites Acquired        :` |
| **Command Modes** | Global command mode |

In addition to the configurable parameters, the current number of satellites acquired by the GPS receiver is also displayed.

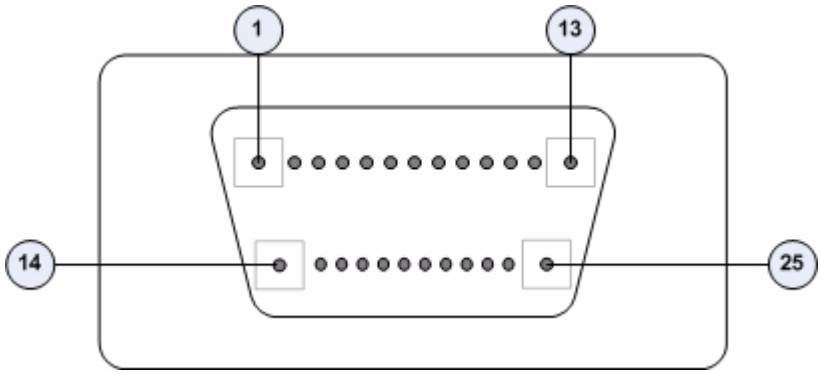
### 4.3.14.3 Managing Dry-contact Input Alarms

Dry-contact input alarms are external devices that are connected to the 4Motion unit, and notify the system when there is a change in external conditions. When

the system receives this notification, an SNMP trap is sent to the EMS. For example, a device such as a temperature sensor that is connected to the 4Motion unit, and configured to function as a dry-contact input alarm, can raise an alarm to the system when there is a sudden change in the room temperature. The system then sends an SNMP trap to the EMS, notifying the administrator of the change indicated by the external device.

Dry contact input alarms are connected to the 4Motion system via a 25-pin micro D-Type ALRM-IN/OUT connector on the NPU front panel. The following figure depicts the ALRM-IN/OUT connector, and the pin numbers assigned to each pin:

**Figure 4-2: 25-pin Micro D-Type ALRM-IN/OUT Connector**




You can configure upto eight dry contact input alarms, each mapping to a different pin number. This section describes the commands to be executed for:

- “Mapping a Dry-contact Input Alarm to an Alarm Condition” on page 432
- “Disabling Dry-contact Input Alarms” on page 435

#### 4.3.14.3.1 Mapping a Dry-contact Input Alarm to an Alarm Condition

Dry contact alarms are connected to the 4Motion unit via the 25-pin micro D-Type ALRM-IN/OUT connector on the front panel of the NPU. You can configure upto eight dry contact input alarms, each connected to a different pin on the ALRM-IN/OUT connector. Each alarm can then map to any of the following alarm conditions. If the external dry-contact alarm detects that any of these conditions is fulfilled, an alarm is raised, and a corresponding trap is sent to the EMS.

**IMPORTANT**

Dry-contact input alarms are a means to raise a trap to the EMS when a change in conditions is notified by the external device. However, the trap may not reach the EMS because of trap rate limiting, network congestion or for reasons relating to the external equipment. **Alvarion** does not assume responsiblity for traps that are lost.

- Commercial power failure
- Fire
- Enclosure door open
- High temperature
- Flood
- Low fuel
- Low battery threshold
- Generator failure
- Intrusion detection
- External equipment failure

To map the a dry contact alarm to an alarm condition, run the following command:

**npu(config)# dry-contact IN** <alarm_num (1-8)> **alarm** {**CommercialPowerFailure** | **Fire** | **EnclosueDoorOpen** | **HighTemperature** | **Flood** | **LowFuel** | **LowBatteryThreshold** | **GeneratorFailure** | **IntrusionDetection** | **ExternalEquipmentFailure**}

In this command, the `alarm_num` parameter maps to a pin on the ALRM IN-OUT connector.

The following table lists the pin numbers of the 25-pin micro D-Type ALRM-IN/OUT connector corresponding to the alarm number you are configuring:

**Table 4-44: Pin Numbers Corresponding to Dry Contact Input Alarm Numbers**

| Pin Number | Alarm Number |
|---|---|

**Table 4-44: Pin Numbers Corresponding to Dry Contact Input Alarm Numbers**

| | |
|---|---|
| 3 and 15 | 1 |
| 4 and 16 | 2 |
| 1 and 17 | 3 |
| 6 and 18 | 4 |
| 7 and 19 | 5 |
| 8 and 20 | 6 |
| 9 and 21 | 7 |
| 10 and 22 | 8 |

Refer Figure 4-2 for a diagrammatic representation of the 25-pin micro D-Type ALRM-IN/OUT connector and the numbers assigned to each pin.

**NOTE**

For more information about displaying the alarm conditions currently mapped to the micro D-Type ALRM-IN/OUT connector pins, refer Section 4.3.14.5.

**Command Syntax**

```
npu(config)# dry-contact IN <alarm_num (1-8)> alarm
{CommercialPowerFailure | Fire | EnclosueDoorOpen | HighTemperature |
Flood | LowFuel | LowBatteryThreshold | GeneratorFailure |
IntrusionDetection | ExternalEquipmentFailure}
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <alarm_num (1-8)> | Indicates the alarm number of the dry contact input alarm that is to be mapped to an alarm condition. This alarm number corresponds to a pin on the 25-pin micro D-Type jack .<br>For more information about the pin numbers that correspond to the alarm number, refer Table 4-44. | Mandatory | N/A | 1-8 |

| | | | | | |
|---|---|---|---|---|---|
| | `alarm {CommercialPowerFailure \| Fire \| EnclosueDoorOpen \| HighTemperature \| Flood \| LowFuel \| LowBatteryThreshold \| GeneratorFailure \| IntrusionDetection \| ExternalEquipmentFailure` | Indicates the alarm condition to be mapped to a pin number. | Mandatory | N/A | ■ CommercialPowerFailure<br>■ Fire<br>■ EnclosueDoorOpen<br>■ HighTemperature<br>■ Flood<br>■ LowFuel<br>■ LowBatteryThreshold<br>■ GeneratorFailure<br>■ IntrusionDetection External<br>■ ExternalEquipmentFailure (can be used for defining a condition other than the ones specified by the other parameters in this command) |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

### 4.3.14.3.2 Disabling Dry-contact Input Alarms

To disable a dry contact input alarm mapped to a specific alarm condition, run the following command:

**`npu(config)# no dry-contact IN`** `<alarm_num (1-8)>`

**NOTE**

For more information about mapping dry contact alarms to an alarm condition, refer to "Mapping a Dry-contact Input Alarm to an Alarm Condition" on page 432. For more information about displaying the alarm condition currently mapped to an alarm, refer to "Displaying Configuration Information for Dry-contact Input/Output Alarms" on page 439.

**Command Syntax**

```
npu(config)# no dry-contact IN <alarm_num (1-8)>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <alarm_num (1-8)> | Indicates the alarm number of the dry contact input alarm alarm that is to be disabled. The value of this parameter should be between 1 and 8.<br>For more information about the pin numbers that correspond to the alarm number, refer Table 4-44. | Mandatory | N/A | 1-8 |

**Command Modes**

Global configuration mode

## 4.3.14.4 Managing Dry-contact Output Alarms

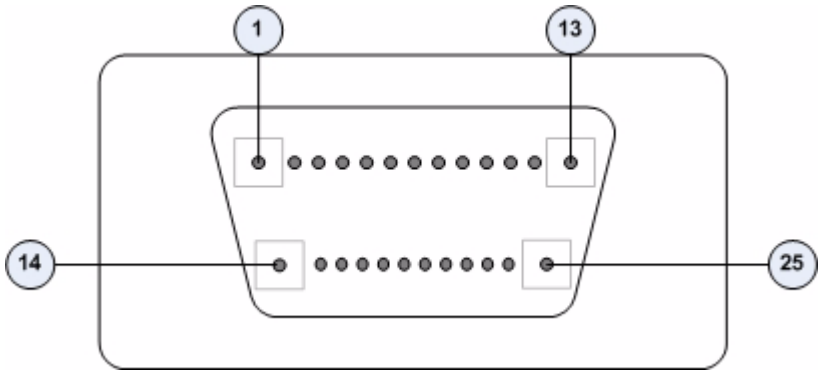
Dry-contact output alarms are raised by the system to notify an external device connected to the 4Motion unit about a change in the system state. The external monitoring entity may take the appropriate action after receiving the notification from the 4Motion system.

You can use the CLI to raise an alarm to the external entity that is connected to the dry contact output pin. After the system returns to its normal state, you can clear the dry contact output alarm that you had raised.

Dry contact output alarms are connected to the 4Motion system via a 25-pin micro D-Type ALRM-IN/OUT connector on the NPU front panel. The following

figure depicts the ALRM-IN/OUT connector, and the pin numbers assigned to each pin:

**Figure 4-3: 25-pin Micro D-Type ALRM-IN/OUT Connector**




You can configure upto three dry contact output alarms, each mapping to a different pin number. This section describes the commands used for:

- "Raising Dry-contact Output Alarms" on page 437
- "Clearing Dry-contact Output Alarms" on page 438

#### 4.3.14.4.1 Raising Dry-contact Output Alarms

You can raise a dry contact output alarm to any external entity that is connected to the 4Motion unit via the 25-pin micro D-Type jack on the NPU front panel. To raise a dry contact output alarm, run the following command:

```
npu(config)# dry-contact OUT <alarm_num (1-3)> alarm <alarm name (256)>
```

In this command, the alarm_num parameter maps to a specific pin of the micro D-Type ALRM-IN/OUT connector. The following table lists the pin numbers of the 25-pin micro D-Type ALRM-IN/OUT connector corresponding to the alarm number you are configuring:

**Table 4-45: Pin Numbers Corresponding to Dry Contact Output Alarm Numbers**

| Pin Number | Corresponding Alarm Number |
|---|---|
| 1(FIX) - 2(N.C) - 14(N.O) | 1 |
| 11(FIX)- 12(N.C) - 13(N.O) | 2 |
| 23(FIX) - 24(N.C) - 25(N.O) | 3 |

In this table, N.C denotes Not Closed, and N.O denotes Not Open.

Refer Figure 4-3 for a diagrammatic representation of the 25-pin micro D-Type ALRM-IN/OUT connector and the numbers assigned to each pin.

**NOTE**

After you have raised an alarm, clear this alarm when the system state returns to its normal condition. For information, refer to, "Clearing Dry-contact Output Alarms" on page 438. For more information about displaying configuration information about a dry contact output alarm, refer to "Displaying Configuration Information for Dry-contact Input/Output Alarms" on page 439.

**Command Syntax**

```
npu(config)# dry-contact OUT <alarm_num (1-3)> alarm <alarm name (256)>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<alarm_num (1-3)>` | Indicates the alarm number of the dry contact output alarm that is to be configured. This alarm number corresponds to a pin on the 25-pin micro D-Type jack .<br>For more information about pin numbers that correspond to the alarm number, refer Table 4-45. | Mandatory | N/A | 1-3 |
| `alarm <alarm name (256)>` | Indicates the name of the dry-contact alarm to be raised. | Mandatory | N/A | Upto 256 characters |

**Command Modes**

Global configuration mode

### 4.3.14.4.2 Clearing Dry-contact Output Alarms

After the system returns to its normal state, run the following command to clear the dry-contact output alarm that you had raised:

```
npu(config)# no dry-contact OUT <alarm_num (1-3)>
```

After you run this command, the alarm that you had raised is cleared.

**NOTE**

For more information about raising a dry contact ouput alarm, refer to "Raising Dry-contact Output Alarms" on page 437.

**Command Syntax**

```
npu(config)# no dry-contact OUT <alarm_num (1-3)>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <alarm_num (1-3)> | Indicates the alarm number of the dry contact output alarm alarm that is to be disabled.<br>For more information about the pin numbers that correspond to the alarm number, refer Table 4-45. | Mandatory | N/A | 1-3 |

**Command Modes**

Global configuration mode

### 4.3.14.5 Displaying Configuration Information for Dry-contact Input/Output Alarms

To display configuration information for dry-contact input/output alarms, run the following command:

```
npu# show dry-contact {IN | OUT} [<alarm_num>]
```

If you want to display configuration information for input or output alarms, specify **IN** or **OUT**. You can also specify the pin number if you want to view configuration information for particular pin used for connecting an external device to the 4Motion unit.

For example, run the following command if you want to display configuration information for the dry contact input alarm connected to the 4Motion unit via pin# 8 on the NPU panel:

```
npu# show dry-contact IN 8
```

If you want to display configuration information for all dry contact alarms, run the following command:

```
npu# show dry-contact
```

**NOTE**

An error may occur if you have specified an incorrect pin number for a particular input/output alarm. For more information about the correct pin-to-alarm number mapping, refer Table 4-44 and Table 4-45.

**Command Syntax**

```
npu# show dry-contact {IN | OUT} [<alarm_num>]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {IN\|OUT} | Indicates whether configuration information is to be displayed for input or output alarms. If you do not specify this value, configuration information is displayed for all input and output alarms. | Optional | N/A | ■ IN<br>■ OUT |

| | | | | | |
|---|---|---|---|---|---|
| | [<alarm_num>] | Denotes the alarm number of the input or output alarm for which configuration information is to be displayed.<br>Refer Figure 4-2 and Figure 4-3 for more information about the numbers assigned to the pins used for connecting dry contact alarms. | Optional | N/A | ■ 1-8 for input alarms<br>■ 1-3 for output alarms |

**Display Format**

```
Dry-Contact Input Alarm:
AlarmNumber   AlarmName   InputBlocking
<alarm num>   <alarm name>  <Yes or No>

Dry-Contact Output Alarm:
AlarmNumber  AlarmStatus  AlarmName
<alarm num>    <On or Off>   <name>
```

**Command Modes**

Global command mode

### 4.3.14.6 Configuring the Location Information for the 4Motion Shelf

Run the following command to configure the 4Motion shelf location information, such as the rack number and location:

**npu(config)# site** {**Name** <name (32)> | **Address** <address(32)> | **RackLocation** <rack no. + position in rack (32)> | **ContactPerson** <name (32)> | **AsnName** <name (32)> |**Region** <**area** (32)> |**ProductType** {**BreezeMax4M** | **MacroSite**}}

For example, run the following command if you want to specify the product type:

**npu(config)# site ProductType BreezeMAX4M**

**IMPORTANT**

An error may occur if the length of any of these parameters exceeds the specified range. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

**npu(config)# site (Name** <name (32)> | **Address** <address(32)**>** | **RackLocation** <rack no. + position in rack (32)> | **ContactPerson** <name (32)> |**AsnName** <name (32)> |**Region <area** (32)**>** |**ProductType** {**BreezeMax4M** | **MacroSite**}**)**

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| Name <name (256)>} | Indicates the name of the 4Motion shelf. | Optional | N/A | String (up to 32 characters) |
| Address <address (256)>} | Indicates the address of the 4Motion site. | Optional | N/A | String (up to 32 characters) |
| RackLocation <rack no. + position in rack (256)>} | Indicates the rack number and location of the 4Motion shelf. | Optional | N/A | String (up to 32 characters) |
| ContactPerson <name (256)> | Indicates the name of person who is administering the 4Motion shelf. | Optional | | String (up to 32 characters) |
| AsnName <name (256)> | Indicates the name of the Access Service Network for which 4Motion is serving as the ASN gateway. | Optional | N/A | String (up to 32 characters) |
| Region <area (256)> | Indicates the region where the site is located. | Optional | N/A | String (up to 32 characters) |
| ProductType {BreezeMAX4M \| MacroSite} | Indicates the product type. | Optional | BreezeMax4M | ■ BreezeMax4M<br>■ MacroSite |

**Command Modes**

Global configuration mode

### 4.3.14.7 Configuring the Unique Identifier for the 4Motion Shelf

You can configure a unique identifier for the 4Motion shelf. This identifier is used to identify the shelf when a trap is sent to the SNMP Manager. (All traps contain the site ID to identify the source that is sending the traps.)

To configure a unique identifier for the 4Motion shelf, run the following command:

```
npu(config)# site identifier <integer>
```

**NOTE**

To display the 4Motion shelf identifer, refer to "Displaying the Unique Identifier for the 4Motion Shelf" on page 762.

**Command Syntax**

```
npu(config)# site identifier <integer>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <integer> | Indicates the ID of the 4Motion shelf. | Mandatory | N/A | $2^{32}$-1 |

**Command Modes**

Global configuration mode

# 4.4 Managing AUs

Up to seven AU objects can be created and configured, corresponding to the AU cards that can be installed in slots 1-4, 7-9 of the shelf.

**NOTE**

In Release 2.0 up to 3 AUs may be used for service provisioning.

**To configure an AU:**

1. Enable the AU configuration mode for the selected AU (refer to Section 4.4.1)
2. You can now execute any of the following tasks:
   - Configure one or more of the parameters tables of the AU (refer to Section 4.4.2)
   - Restore the default values of parameters in one or more of the parameters tables of the AU (refer to Section 4.4.3)
3. Terminate the AU configuration mode (refer to Section 4.4.4)

In addition, you can, at any time, display configuration and status information for each of the parameters tables of the AU (refer to Section 4.4.6) or delete an existing AU object (refer to Section 4.3.10.11.5).

## 4.4.1 Enabling the AU Configuration Mode\Creating an AU Object

To configure the parameters of an AU, first enable the AU configuration mode for the specific AU. Run the following command to enable the AU configuration mode. You can also use this command to create a new AU object. A new AU object is created with default values for all parameters.

```
npu (config)# au <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)>
```

Specify the slot ID of the AU to be configured/created. See Figure 4-1 for slot assignment in the shelf.

For example, to configure the AU in slot# 1, run the following command:

```
npu (config)# au 1
```

**IMPORTANT**

An error occurs if you specify an AU slot ID that is not in the range, 1-4, or 7-9.

If you use this command to create a new AU, the configuration mode for this AU is automatically enabled, after which you can execute any of the following tasks:

- Configure one or more of the parameters tables of the AU (refer to Section 4.4.2)
- Restore the default values of parameters in one or more of the parameters tables of the AU (refer to Section 4.4.3)

After executing the above tasks, you can terminate the AU configuration mode (refer to Section 4.4.4) and return to the global configuration mode.

**Command Syntax**

```
npu (config)# au <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)> | The slot ID of the AU to be configured | Mandatory | N/A | ■ 1-4<br>■ 7-9 |

**Command Modes**

Global configuration mode

**NOTE**

The following examples are for au configuration mode for au-1 .

## 4.4.2 Configuring AU Parameters

After enabling the AU configuration mode you can configure the following parameters tables:

- Properties (refer to Section 4.4.2.1)
- Control (refer to Section 4.4.2.2)
- Connectivity (refer to Section 4.4.2.3)
- Reserved (refer to Section 4.4.2.4)

### 4.4.2.1 Configuring Properties

The properties table enables configuring the main properties of the required AU card and controlling the power on each of the AU's ODU ports.

To configure the properties parameters, run the following command:

**npu(config-au-1)# properties** [required-type {typeThree | typeTwo} ] [required-ports {four} ] [required-bandwidth {fourteen | twenty | notrequired} ] [port-1-power {shutDown | noShutDown} ] [port-2-power {shutDown | noShutDown} ] [port-3-power {shutDown | noShutDown | NA} ] [port-4-power {shutDown | noShutDown | NA} ]

**NOTE**

You can display configuration information for the AU properties. For details, refer to Section 4.4.6.1.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-au-1)# properties [required-type {typeThree | typeTwo}
] [required-ports {four} ] [required-bandwidth {fourteen | twenty
| notrequired} ] [port-1-power {shutDown | noShutDown} ]
[port-2-power {shutDown | noShutDown} ] [port-3-power {shutDown |
noShutDown | NA} ] [port-4-power {shutDown | noShutDown | NA} ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [required-type {typeThree \| ttypeTwo} ] | Defines the AU card configuration required.<br>In the current release only typeTwo AU is available. | Optional | typeThree | ■ typeThree<br>■ typeTwo |
| [required-ports {two \| four} ] | Defines the No of AU card ODU ports required.<br>In the current release only four-ports AU is available. | Optional | Four | ■ Four |
| [required-bandwidth {fourteen \| twenty \| notrequired} ] | Defines the AU card Bandwidth (in MHz) required.<br>In the current release all cards can support up to 20 MHz, except to previous generation cards that can support up to 14 MHz. | Optional | Twenty | ■ Fourteen<br>■ Twenty<br>■ notrequired |
| [port-1-power {shutDown \| noShutDown} ] | Controls power from AU card port 1 to ODU | Optional | No Shutdown | ■ shutDown<br>■ noShutDown |
| [port-2-power {shutDown \| noShutDown} ] | Controls power from AU card port 2 to ODU. | Optional | No Shutdown | ■ shutDown<br>■ noShutDown |
| [port-3-power {shutDown \| noShutDown \| NA} ] | Controls power from AU card port 3 to ODU.<br>The NA (Not Applicable) option is not relevant for a four-ports AU. | Optional | No Shutdown | ■ shutDown<br>■ noShutDown<br>■ NA |
| [port-4-power {shutDown \| noShutDown \| NA} ] | Controls power from AU card port 4 to ODU.<br>The NA (Not Applicable) option is not relevant for a four-ports AU. | Optional | No Shutdown | ■ shutDown<br>■ noShutDown<br>■ NA |

**Command Modes**

au configuration mode

### 4.4.2.2 Configuring the Control Parameter

The control parameters enables controlling the operation of the AU.

To configure the control parameter, run the following command:

**npu(config-au-1)#** control shutdown-operation {normalOperation | reset | shutdown}

**Command Syntax**

**npu(config-au-1)# control shutdown-operation** {normalOperation | reset | shutdown}

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| shutdown-operation {normalOperation \| reset \| shutdown} | Controls the operation of the AU card: Normal Operation, Shutdown (disable power to card) or Reset. | Mandatory | normal Operation | ■ normalOperation<br>■ reset<br>■ shutdown |

**Command Modes**

au configuration mode

### 4.4.2.3 Configuring Connectivity

The connectivity tables enables configuring the connectivity parameters for the Ethernet interface of the AU. In the current release the interface operates in 802.1q mode: In this mode, the interface accepts only VLAN-tagged packets. All packets received without VLAN tags are dropped.

To configure the connectivity parameters, run the following command:

**npu(config-au-1)# connectivity** [maxframesize <(1518 to 9000 StepSize 1)>] [bearervlanid <(0 to 4092 StepSize 1)>]

**Command Syntax**

**npu (config-au-1)# connectivity** [maxframesize <(1518 to 9000 StepSize 1)>] [bearervlanid <(0 to 4092 StepSize 1)>]

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [maxframesize <(1518 to 9000 StepSize 1)>] | The maximum frame size (in Bytes) that can be accepted on the Ethernet interface of the AU. Larger packets will be dropped.<br>In 802.1q encapsulation mode the actual minimal frame size (including VLAN tag) is 1522 bytes, which is also the default.<br>Must be configured to the same value as the mtu parameter for this interface in the NPU. | Optional | 1522 | 1518 to 9000 |
| [bearervlanid <(0 to 4092 StepSize 1)>] | The VLAN ID of packets on the Ethernet interface of the AU. It must be configured to the same value as the if_vlan parameter of the bearer interface in the NPU.<br>Note that VLAN 10 is used for internal management and cannot be used the bearer VLAN. | Optional | 11 | 0-4092 |

**Command Modes** au-1 configuration mode

## 4.4.2.4 Configuring AU Reserved Parameters

As the name implies, the reserved parameters table enables configuring up to 9 parameters that are reserved for possible future use. In the current release none of the reserved parameters is being used.

To configure the AU reserved parameters, run the following command:

```
npu(config-au-1)# au-reserved [reserved-1 <string (32)>]
[reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4
<string (32)>] [reserved-5 <string (32)>] [reserved-6 <string
(32)>] [reserved-7 <string (32)>] [reserved-8 <string (32)>]
[reserved-9 <string (32)>]
```

**Command Syntax**

```
npu (config-au-1)# au-reserved [reserved-1 <string (32)>]
[reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4
<string (32)>] [reserved-5 <string (32)>] [reserved-6 <string
(32)>] [reserved-7 <string (32)>] [reserved-8 <string (32)>]
[reserved-9 <string (32)>]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [reserved-N <string (32)>] (N=1-9) | Reserved parameter number N | Optional | null (an empty string) | A string of 32 printable characters. |

**Command Modes**

au configuration mode

## 4.4.3 Restoring Default Values for AU Configuration Parameters

After enabling the AU configuration mode you can restore the default values for parameters in the following parameters tables:

- Properties (refer to Section 4.4.3.1)
- Control (refer to Section 4.4.3.2)
- Connectivity (refer to Section 4.4.3.3)
- Reserved (refer to Section 4.4.3.4)

### 4.4.3.1 Restoring the Default Values of Properties Parameters

To restore the some or all of the Properties parameters to their default value, run the following command:

```
npu(config-au-1)# no properties [required-type] [required-ports]
[required-bandwidth] [port-1-power] [port-2-power] [port-3-power]
[port-4-power]
```

You can restore only selected parameters to their default value by specifying only those parameter. For example, to restore only the required type to the default value (threeDSP), run the following command:

```
npu(config-au-1)# no properties required-type
```

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all properties parameters to their default value, run the following command:

```
npu(config-au-1)# no properties
```

**NOTE**

Refer to Section 4.4.2.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-au-1)# no properties [required-type] [required-ports] [required-bandwidth] [port-1-power] [port-2-power] [port-3-power] [port-4-power]` |
| **Privilege Level** | 10 |
| **Command Modes** | au configuration mode |

### 4.4.3.2 Restoring the Default Value of the Control Parameter

To restore the Control parameter to the default value (normalOperation), run the following command:

```
npu(config-au-1)# no control
```

| | |
|---|---|
| **Command Syntax** | **npu(config-au-1)# no control** |
| **Privilege Level** | 10 |
| **Command Modes** | Global configuration mode |

### 4.4.3.3 Restoring the Default Values of Connectivity Parameters

To restore Connectivity parameters do their default value, run the following command:

**npu(config-au-1)# no connectivity** [maxframesize] [bearervlanid]

You can restore only one of the parameters to its default value by specifying only that parameter. For example, to restore only the maximum frame size to the default (1522), run the following command:

**npu(config-au-1)# no connectivity maxframesize**

The maximum frame size will be restored to its default value, while the bearervlanid parameter will remain unchanged.

To restore both parameters to their default value, run the following command:

**npu(config-au-1)# no connectivity**

**NOTE**

Refer to Section 4.4.2.3 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-au-1)# no connectivity** [maxframesize] [bearervlanid] |
| **Privilege Level** | 10 |
| **Command Modes** | au configuration mode |

### 4.4.3.4 Restoring the Default Values of AU Reserved Parameters

To restore the AU Reserved parameters to their default value, run the following command:

```
npu(config-au-1)# no au-reserved [reserved-1] [reserved-2]
[reserved-3] [reserved-4] [reserved-5] [reserved-6] [reserved-7]
[reserved-8] [reserved-9]
```

You can restore only selected parameters to their default value by specifying only those parameter. For example, to restore only the reserved-1 parameter to its default values, run the following command:

```
npu(config-au-1)# no au-reserved reserved-1
```

This parameter will be restored to the default value, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

```
npu(config-au-1)# no au-reserved
```

**NOTE**

Refer to Section 4.4.2.4 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-au-1)# no au-reserved [reserved-1] [reserved-2] [reserved-3] [reserved-4] [reserved-5] [reserved-6] [reserved-7] [reserved-8] [reserved-9]` |
| **Privilege Level** | 10 |
| **Command Modes** | Global configuration mode |

## 4.4.4 Terminating the AU Configuration Mode

Run the following command to terminate the au configuration mode:

```
npu(config-au-1)# exit
```

| | |
|---|---|
| **Command Syntax** | **npu(config-au-1)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | au-1 configuration mode |

## 4.4.5 Deleting an AU Object

Run the following command to delete an AU object:

**npu(config)# no au** <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)>

**IMPORTANT**

An associated AU (specified in a Sector Association) cannot be deleted.

| | |
|---|---|
| **Command Syntax** | **npu(config)# no au** <(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)> | The slot ID of the AU card | Mandatory | N/A | 1-4, 7-9 |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

## 4.4.6 Displaying Configuration and Status Information for AU Parameters

You can display the current configuration and (where applicable) additional status information for the following parameters tables:

- Properties (refer to Section 4.4.6.1)
- Control (refer to Section 4.4.6.2)
- Connectivity (refer to Section 4.4.6.3)
- Reserved (refer to Section 4.4.6.4)

### 4.4.6.1 Displaying Configuration and Status Information for AU Properties

To display configuration and status information for the properties of a specific or all AU objects , run the following command:

**npu# show properties au** [<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> ]

Specify the au slot ID (1-4, 7-9) if you want to display configuration and status information for a particular AU. Do not specify a value for this parameter if you want to view configuration and status information for all existing AU objects.

| | |
|---|---|
| **Command Syntax** | **npu# show properties au** [<(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)>] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)>] | The slot ID of the AU<br><br>Specify a value for this parameter if you want to display the properties of a specific AU. Do not specify a value for this parameter if you want to display the properties of all AUs. | Optional | N/A | 1-4, 7-9 |

**Display Format**

(for each existing AU object if requested for all AUs)

```
SlotNo.                  :<value>
RequiredType             :<value>
RequiredPorts            :<value>
RequiredBandwidth(MHz)   :<value>
InstalledStatus          :<value>
InstalledType            :<value> (0 for notinstalled AU)
InstalledPorts           :<value> (0 for notinstalled AU)
InstalledBandwidth(MHz)  :<value> (0 for notinstalled AU)
HWVersion                :<value> (null for notinstalled AU)
HWRevision               :<value> (null for notinstalled AU)
SerialNo.                :<value> (null for notinstalled AU)
BootVersion              :<value> (null for notinstalled AU)
IFVersion                :<value> (null for notinstalled AU)
IFRevision               :<value> (null for notinstalled AU)
Port1PowertoODU          :<value>
Port2PowertoODU          :<value>
Port3PowertoODU          :<value>
Port4PowertoODU          :<value>
```

**Command Modes**

Global command mode

In addition to the configurable parameters, the following status parameters are also displayed:

| Parameter | Description | Possible Values |
|---|---|---|
| InstalledStatus | Indicates whether an AU card is installed in the slot.<br>Following parameters are applicable only for installed AU. | ■ installed (1)<br>■ notinstalled (0) |
| InstalledType | The AU Type. | ■ threeDSP (1)<br>■ twoDSP (2)<br>■ other (3)<br>■ auNotDetected (4) |
| InstalledPorts | The number of ODU ports. | two (1)<br>four (2)<br>other (3)<br>auNotDetected (4) |
| InstalledBandwidth(MHz) | The bandwidth supported by the AU. | fourteen (1)<br>twenty (2)<br>other (3)<br>auNotDetected (4) |
| HWVersion | AU HW Version number | <number> |
| HWRevision | AU HW Revision number | <number> |
| SerialNo. | AU Serial number | <number> |
| BootVersion | AU Boot SW Version number | <string> |
| IFVersion | AU IF Version number | <number> |
| IFRevision | AU HW Revision number | <number> |

### 4.4.6.2 Displaying Configuration for AU Control

To display configuration for the Control parameter of a specific or all AU objects , run the following command:

**npu# show control au** [<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> ]

Specify the au slot ID (1-4, 7-9) if you want to display configuration information for a particular AU. Do not specify a value for this parameter if you want to view configuration information for all existing AU objects.

**Command Syntax**

**npu# show control au** [<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)>] | The slot ID of the AU<br>Specify a value for this parameter if you want to display the control parameter of a specific AU. Do not specify a value for this parameter if you want to display the control parameters of all AUs. | Optional | N/A | 1-4, 7-9 |

**Display Format**

(for each existing AU object if requested for all AUs)

```
SlotNo.                 :<value>
AUPowerControl          :<value>
```

**Command Modes**

Global command mode

### 4.4.6.3 Displaying Configuration Information for AU Connectivity Parameters

To display configuration information for the connectivity parameters of a specific or all AU objects , run the following command:

**npu# show connectivity au** [<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> ]

Specify the au slot ID (1-4, 7-9) if you want to display configuration for a particular AU. Do not specify a value for this parameter if you want to view configuration for all existing AU objects.

The displayed information includes also configured values for relevant parameters that are configured for the internal management interface of the NPU.

**Command Syntax**

**npu# show connectivity au** [<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)>] | The slot ID of the AU<br>Specify a value for this parameter if you want to display the connectivity parameters of a specific AU. Do not specify a value for this parameter if you want to display the connectivity parameters of all AUs. | Optional | N/A | 1-4, 7-9 |

**Display Format**

(for each existing AU object if requested for all AUs)

```
SlotNo.                          :<value>
EncapsulationMode                :vlanAwareBridging(0)
MaxFrameSize(Bytes)              :<value>
InternalManagementVLANID         :<value>
BearerVLANID                     :<value>
InternalManagementIPAddress      :<value>
InternalManagementIPSubnetMask :<value>
```

**Command Modes**

Global command mode

In addition to the configurable parameters, the following status parameters are also displayed:

| Parameter | Description | Possible Values |
|---|---|---|
| EncapsulationMode | The Ethernet encapsulation mode of the card's Ethernet port (hard coded in production). | vlanAwareBridging(0) |
| InternalManagementVLANID | The VLAN ID Management of the shelf.(hard coded in production) | 0-4092 |
| InternalManagementIPAddress | IP Address of the internainterface of the AU. Acquired via DHCP. | IP address |
| InternalManagementIPSubnetMask | Subnet Mask of the internainterface of the AU. Acquired via DHCP. | Subnet mask |

### 4.4.6.4 Displaying Configuration Information for AU Reserved Parameters

To display configuration information for the reserved parameters of a specific or all AU objects , run the following command:

**npu# show au-reserved au** [<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> ]

Specify the au slot ID (1-4, 7-9) if you want to display configuration for a particular AU. Do not specify a value for this parameter if you want to view configuration for all existing AU objects.

| | |
|---|---|
| **Command Syntax** | **npu# show au-reserved au** [<(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)>] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)>] | The slot ID of the AU<br><br>Specify a value for this parameter if you want to display the reserved parameters of a specific AU. Do not specify a value for this parameter if you want to display the reserved parameters of all AUs. | Optional | N/A | 1-4, 7-9 |

**Display Format**

(for each existing AU object if requested for all AUs)

```
SlotNo.                    :<value>
ReservedParameter1         :<value>
ReservedParameter2         :<value>
ReservedParameter3         :<value>
ReservedParameter4         :<value>
ReservedParameter5         :<value>
ReservedParameter6         :<value>
ReservedParameter7         :<value>
ReservedParameter8         :<value>
ReservedParameter9         :<value>
```

**Command Modes**

Global command mode

# 4.5 Managing ODUs

Up to 28 ODU objects can be created and configured, corresponding to up to 28 ODUs that can be installed. Up to four ODU Ports, numbered 1 to 4, can be created and configured for each ODU. However, for a 1by1 ODU only port number 1 is meaningful. For a 2by1 ODU only ports 1 and 2 are meaningful.

This section include:

- "Configuring ODUs", Section 4.5.1
- "Configuring ODU Ports", Section 4.5.2

## 4.5.1 Configuring ODUs

**To configure an ODU:**

1. Enable the ODU configuration mode for the selected ODU (refer to Section 4.5.1.1)
2. You can now execute any of the following tasks:
   - » Configure one or more of the parameters tables of the ODU (refer to Section 4.5.1.2)
   - » Restore the default values of parameters in one or more of the parameters tables of the ODU (refer to Section 4.5.1.3)
3. Terminate the ODU configuration mode (refer to Section 4.5.1.4)

In addition, you can, at any time, display configuration and status information for each of the parameters tables of the ODU (refer to Section 4.5.1.6) or delete an existing ODU object (refer to Section 4.5.1.5).

### 4.5.1.1 Enabling the ODU Parameters Configuration Mode\Creating an ODU Object

To configure the parameters of an ODU, first enable the ODU parameters configuration mode for the specific ODU. Run the following command to enable the ODU parameters configuration mode for an existing ODU object:

**npu (config)# odu-params** <(1 to 28 StepSize 1)>

To create a new ODU object, the mandatory required-odu-type parameter must be specified. Run the following command to create a new ODU object and enable the parameters configuration mode for this ODU:

npu (config)# odu-params <(1 to 28 StepSize 1)> required-odu-type {oDU23002360000N361by1N0 | oDU24962602000N361by1N0 | oDU25902690000N361by1N0 | oDU24962602000N382by1N0 | oDU25902690000N382by1N0 | oDU34003455000N341by1N0 | oDU34453500000N341by1N0 | oDU35003555000N341by1N0 | oDU35453600000N341by1N0 | oDU24962602000N384by2N0 | oDU25902690000N384by2N0 | oDU34003600000N372by1N0 | oDU36003800000N372by1N0 | oDU34003600000N374by2N0 | oDU36003800000N374by2N0 | oDU23052360000N361by1Y0 | oDU24962602000N392by1N0 | oDU25902690000N392by1N0 | oDU24962602000N394by2N0 | oDU25902690000N394by2N0}

A new ODU object is created with default values for all parameters except to the mandatory required-odu-type parameter.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

For example, to create ODU 1 object and enable the parameters configuration mode for this ODU, where the required odu type is oDU23002360000N361by1N0, run the following command:

**npu (config)# odu-params 1 required-odu-type oDU23002360000N361by1N0**

After enabling the parameters configuration mode for an ODU you can execute any of the following tasks:

- Configure one or more of the parameters tables of the ODU (refer to Section 4.5.1.2)
- Restore the default values of parameters in one or more of the parameters tables of the ODU (refer to Section 4.5.1.3)

After executing the above tasks, you can terminate the ODU parameters configuration mode (refer to Section 4.5.1.4) and return to the global configuration mode.

**Command Syntax**

**npu (config)# odu-params** <(1 to 28 StepSize 1)> [**required-odu-type** {oDU23002360000N361by1N0 | oDU24962602000N361by1N0 | oDU25902690000N361by1N0 | oDU24962602000N382by1N0 | oDU25902690000N382by1N0 | oDU34003455000N341by1N0 | oDU34453500000N341by1N0 | oDU35003555000N341by1N0 | oDU35453600000N341by1N0 | oDU24962602000N384by2N0 | oDU25902690000N384by2N0 | oDU34003600000N372by1N0 | oDU36003800000N372by1N0 | oDU34003600000N374by2N0 | oDU36003800000N374by2N0 | oDU23052360000N361by1Y0 | oDU24962602000N392by1N0 | oDU25902690000N392by1N0 | oDU24962602000N394by2N0 | oDU25902690000N394by2N0}

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 28 StepSize 1)> | The ODU number | Mandatory | N/A | 1-28 |

| | | | | | |
|---|---|---|---|---|---|
| | required-odu-type {oDU2300236000 0N361by1N0 \| oDU2496260200 0N361by1N0 \| oDU2590269000 0N361by1N0 \| oDU2496260200 0N382by1N0 \| oDU2590269000 0N382by1N0 \| oDU3400345500 0N341by1N0 \| oDU3445350000 0N341by1N0 \| oDU3500355500 0N341by1N0 \| oDU3545360000 0N341by1N0 \| oDU2496260200 0N384by2N0 \| oDU2590269000 0N384by2N0 \| oDU3400360000 0N372by1N0 \| oDU3600380000 0N372by1N0 \| oDU3400360000 0N374by2N0 \| oDU3600380000 0N374by2N0 \| oDU2305236000 0N361by1Y0 \| oDU2496260200 0N392by1N0 \| oDU2590269000 0N392by1N0 \| oDU2496260200 0N394by2N0 \| oDU2590269000 0N394by2N0} | The required ODU type (see details below). | Mandatory for a new ODU object | N/A | ■ oDU23002360000N361by1N0<br>■ oDU24962602000N361by1N0<br>■ oDU25902690000N361by1N0<br>■ oDU24962602000N382by1N0<br>■ oDU25902690000N382by1N0<br>■ oDU34003455000N341by1N0<br>■ oDU34453500000N341by1N0<br>■ oDU35003555000N341by1N0<br>■ oDU35453600000N341by1N0<br>■ oDU24962602000N384by2N0<br>■ oDU25902690000N384by2N0<br>■ oDU34003600000N372by1N0<br>■ oDU36003800000N372by1N0<br>■ oDU34003600000N374by2N0<br>■ oDU36003800000N374by2N0<br>■ oDU23052360000N361by1Y0<br>■ oDU24962602000N392by1N0<br>■ oDU25902690000N392by1N0<br>■ oDU24962602000N394by2N0<br>■ oDU25902690000N394by2N0 |

**Command Modes**

Global configuration mode

ODU Type = oDUAAAABBBBZZZWPPRbyTCS, where:
AAAA = Lower bound of frequency band in MHz, rounded up to the nearest integer.

BBBB = Upper bound of frequency band in MHz, rounded down.
ZZZ = 000 in TDD systems.
W = N in TDD systems.
PP = maximum transmit power in dBm, rounded down.
R = number of receive channels.
T = number of transmit channels.
C = Y if cavity filter is present, N if not.
S = Reserved (0).

The currently available ODUs are:

**Table 4-46: Currently Available Single Port ODU Types**

| ODU Type in CLI | ODU Marketing Nane | Frequency Band (MHz) | Max Tx Power (dBm) |
|---|---|---|---|
| oDU23002360000N361by1N0 | BMAX-AU-ODU-HP-2.3 | 2300-2360 | 36 |
| oDU24962602000N361by1N0 | BMAX-AU-ODU-HP-2.5A | 2496-2602 | 36 |
| oDU25902690000N361by1N0 | BMAX-AU-ODU-HP-2.5B | 2590-2690 | 36 |
| oDU34003455000N341by1N0 | BMAX-AU-ODU-HP-TDD-3.4a | 3400-3455 | 34 |
| oDU34453500000N341by1N0 | BMAX-AU-ODU-HP-TDD-3.4b | 3445-3500 | 34 |
| oDU35003555000N341by1N0 | BMAX-AU-ODU-HP-TDD-3.5a | 3500-3555 | 34 |
| oDU35453600000N341by1N0 | BMAX-AU-ODU-HP-TDD-3.5b | 3545-3600 | 34 |

**Table 4-47: Currently Available 4Rx x 2Tx ODU Types**

| ODU Type in CLI | ODU Marketing Nane | Frequency Band (MHz) | Max Tx Power (dBm) |
|---|---|---|---|
| oDU24962602000N384by2N0 | ODU-2496-2602-000N-38-4x2-N-0 | 2496-2602 | 38 |
| oDU25902690000N384by2N0 | ODU-2590-2690-000N-38-4x2-N-0 | 2590-2690 | 38 |
| oDU34003600000N374by2N0 | ODU-3400-3600-000N-37-4x2-N-0 | 3400-3600 | 37 |
| oDU36003800000N374by2N0 | ODU-3600-3800-000N-37-4x2-N-0 | 3600-3800 | 37 |

**NOTE**

The following examples are for odu-1 parameters configuration mode.

### 4.5.1.2 Configuring ODU Parameters

After enabling the ODU parameters configuration mode you can configure the following parameters tables:

- General (refer to Section 4.5.1.2.1)

- Reserved (refer to Section 4.5.1.2.2)

### 4.5.1.2.1 Configuring General ODU Parameters

The general table enables configuring the main properties of the required ODU.

To configure the general ODU parameters, run the following command:

**npu(config-odu-params-1)# odu-general** [heater-existence {TRUE | FALSE} ] [external-cavity-filter-existence {TRUE | FALSE} ] [required-odu-type {oDU23002360000N361by1N0 | oDU24962602000N361by1N0 | oDU25902690000N361by1N0 | oDU24962602000N382by1N0 | oDU25902690000N382by1N0 | oDU34003455000N341by1N0 | oDU34453500000N341by1N0 | oDU35003555000N341by1N0 | oDU35453600000N341by1N0 | oDU24962602000N384by2N0 | oDU25902690000N384by2N0 | oDU34003600000N372by1N0 | oDU36003800000N372by1N0 | oDU34003600000N374by2N0 | oDU36003800000N374by2N0 | oDU23052360000N361by1Y0 | oDU24962602000N392by1N0 | oDU25902690000N392by1N0 | oDU24962602000N394by2N0 | oDU25902690000N394by2N0} ]

**NOTE**

You can display configuration information for the ODU general parameters. For details, refer to Section 4.5.1.6.1.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-odu-params-1)# odu-general [heater-existence {TRUE |
FALSE} ] [external-cavity-filter-existence {TRUE | FALSE} ]
[required-odu-type {oDU23002360000N361by1N0 |
oDU24962602000N361by1N0 | oDU25902690000N361by1N0 |
oDU24962602000N382by1N0 | oDU25902690000N382by1N0 |
oDU34003455000N341by1N0 | oDU34453500000N341by1N0 |
oDU35003555000N341by1N0 | oDU35453600000N341by1N0 |
oDU24962602000N384by2N0 | oDU25902690000N384by2N0 |
oDU34003600000N372by1N0 | oDU36003800000N372by1N0 |
oDU34003600000N374by2N0 | oDU36003800000N374by2N0 |
oDU23052360000N361by1Y0 | oDU24962602000N392by1N0 |
oDU25902690000N392by1N0 | oDU24962602000N394by2N0 |
oDU25902690000N394by2N0} ]
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [heater-existence {TRUE \| FALSE}] | Informational parameter indicating whether a heater for the ODU exists. | Optional | FALSE | ■ TRUE<br>■ FALSE |
| [external-cavity-filter-existence {TRUE \| FALSE}] | Informational parameter indicating whether an external cavity filter for the ODU exists. | Optional | FALSE | ■ TRUE<br>■ FALSE |
| [required-odu-type {...} ] | The required ODU type.<br>For more details refer to Section 4.5.1.1 | Optional | The previously configured valuw | For details refer to Section 4.5.1.1 |

**Command Modes** odu-params configuration mode

### 4.5.1.2.2 Configuring ODU Reserved Parameters

As the name implies, the reserved parameters table enables configuring up to 9 parameters that are reserved for possible future use. In the current release none of the reserved parameters is being used.

To configure the ODU reserved parameters, run the following command:

```
npu(config-odu-params-1)# odu-reserved [reserved-1 <string (32)>]
[reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4
<string (32)>] [reserved-5 <string (32)>] [reserved-6 <string
(32)>] [reserved-7 <string (32)>] [reserved-8 <string (32)>]
[reserved-9 <string (32)>].
```

**Command Syntax**

```
npu (config-odu-params-1)# odu-reserved [reserved-1 <string (32)>]
[reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4
<string (32)>] [reserved-5 <string (32)>] [reserved-6 <string
(32)>] [reserved-7 <string (32)>] [reserved-8 <string (32)>]
[reserved-9 <string (32)>]
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [reserved-N <string (32)>] (N=1-9) | Reserved parameter number N | Optional | null (an empty string) | A string of 32 printable characters. |

**Command Modes** odu-params configuration mode

### 4.5.1.3 Restoring Default Values for ODU Configuration Parameters

After enabling the ODU parameters configuration mode you can restore the default values for parameters in the following parameters tables:

- General (refer to Section 4.5.1.3.1)
- Reserved (refer to Section 4.5.1.3.2)

#### 4.5.1.3.1 Restoring the Default Values of General Parameters

To restore one or all of the general parameters to their default value (excluding the mandatory required-odu-type parameter), run the following command:

```
npu(config-odu-params-1)# no odu-general [heater-existence]
[external-cavity-filter-existence]
```

You can restore only one parameter to its default value by specifying only that parameter. For example, to restore only the heater-existence to the default value (FALSE), run the following command:

```
npu(config-odu-params-1)# no odu-general heater-existence
```

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all general parameters to their default value, run the following command:

```
npu(config-odu-params-1)# no odu-general
```

**NOTE**

Refer to Section 4.5.1.2.1 for a description and default values of these parameters.

**Command Syntax**

**npu(config-odu-params-1)# no odu-general** [heater-existence] [external-cavity-filter-existence]

**Privilege Level**

10

**Command Modes**

odu-params configuration mode

### 4.5.1.3.2 Restoring the Default Values of ODU Reserved Parameters

To restore the ODU Reserved parameters to their default value, run the following command:

**npu(config-odu-params-1)# no odu-reserved** [reserved-1] [reserved-2] [reserved-3] [reserved-4] [reserved-5] [reserved-6] [reserved-7] [reserved-8] [reserved-9]

You can restore only selected parameters to their default value by specifying only those parameter. For example, to restore only the reserved-1 parameter to its default values, run the following command:

**npu(config-odu-params-1)# no odu-reserved reserved-1**

This parameter will be restored to the default value, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

**npu(config-odu-params-1)# no odu-reserved**

**NOTE**

Refer to Section 4.5.1.2.2 for a description and default values of these parameters.

**Command Syntax**

**npu(config-odu-params-1)# no odu-reserved** [reserved-1] [reserved-2] [reserved-3] [reserved-4] [reserved-5] [reserved-6] [reserved-7] [reserved-8] [reserved-9]

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | odu-params configuration mode |

### 4.5.1.4 Terminating the ODU Parameters Configuration Mode

Run the following command to terminate the ODU Parameters configuration mode:

**npu(config-odu-params-1)# exit**

| | |
|---|---|
| **Command Syntax** | **npu(config-odu-params-1)# exit** |

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | odu-params configuration mode |

### 4.5.1.5 Deleting an ODU Object

Run the following command to delete an ODU object:

**npu(config)# no odu-params** <(1 to 28 StepSize 1)>

**IMPORTANT**

An associated ODU (specified in a Sector Association) cannot be deleted.

| | |
|---|---|
| **Command Syntax** | **npu(config)# no odu-params** <(1 to 28 StepSize 1)> |

| | |
|---|---|
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 28 StepSize 1)> | The ODU number | Mandatory | N/A | 1-28 |

**Command Modes** Global configuration mode

## 4.5.1.6 Displaying Configuration and Status Information for ODU Parameters

You can display the current configuration and (where applicable) additional status information for the following parameters tables:

- General (refer to Section 4.5.1.6.1)
- Reserved (refer to Section 4.5.1.6.2)

### 4.5.1.6.1 Displaying Configuration and Status Information for ODU General Parameters

To display configuration and status information for the general parameters of a specific or all ODU objects , run the following command:

**npu# show odu-general** [odu-no <(1 to 28 StepSize 1)> ]

Specify the ODU number (1-28) if you want to display configuration and status information for a particular ODU. Do not specify a value for this parameter if you want to view configuration and status information for all existing ODU objects.

**Command Syntax** **npu# show odu-general** [odu-no <(1 to 28 StepSize 1)> ]

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [odu-no <(1 to 28 StepSize 1)> ] | The number of the ODU<br><br>Specify a value for this parameter if you want to display the general parameters of a specific ODU. Do not specify a value for this parameter if you want to display the general parameters of all ODUs. | Optional | N/A | 1-28 |

**Display Format**

(for each existing ODU object if requested for all ODUs)

```
ODUNo.                          :<value>
HeaterExistence                 :<value> or (0) if object does not exist
ExternalCavityFilterExistence   :<value> or (0) if object does not exist
RequiredODUType                 :<value> or (0) if object does not exist
InstalledODUType                :<value> or (0) if ODU is not installed
SerialNumber                    :<value> or null if ODU is not installed
```

**Command Modes**

Global command mode

In addition to the configurable parameters, the following status parameters are also displayed:

| Parameter | Description | Possible Values |
|---|---|---|

| | | |
|---|---|---|
| InstalledODUType | The installed ODU Type. | ■ oDU23002360000N361by1N0 (1)<br>■ oDU24962602000N361by1N0 (2)<br>■ oDU25902690000N361by1N0 (3)<br>■ oDU24962602000N382by1N0 (4)<br>■ oDU25902690000N382by1N0 (5)<br>■ oDU34003455000N341by1N0 (6)<br>■ oDU34453500000N341by1N0 (7)<br>■ oDU35003555000N341by1N0 (8)<br>■ oDU35453600000N341by1N0 (9)<br>■ oDU24962602000N384by2N0 (10)<br>■ oDU25902690000N384by2N0 (11)<br>■ oDU34003600000N372by1N0 (12)<br>■ oDU36003800000N372by1N0 (13)<br>■ oDU34003600000N374by2N0 (14)<br>■ oDU36003800000N374by2N0 (15)<br>■ oDU23052360000N361by1Y0 (16)<br>■ oDU24962602000N392by1N0 (17)<br>■ oDU25902690000N392by1N0 (18)<br>■ oDU24962602000N394by2N0 (19)<br>■ oDU25902690000N394by2N0 (20)<br>■ odunotDetected (97)<br>■ odutypeUnknown (98)<br>■ odunotAssociated to sector (0) |
| SerialNumber | The ODU serial number | <number> |

#### 4.5.1.6.2 Displaying Configuration Information for ODU Reserved Parameters

To display configuration information for the reserved parameters of a specific or all ODU objects , run the following command:

**npu# show odu-reserved** [odu-no <(1 to 28 StepSize 1)> ]

Specify the ODU number (1-28) if you want to display configuration for a particular ODU. Do not specify a value for this parameter if you want to view configuration for all existing ODU objects.

**Command Syntax**

**npu# show odu-reserved** [odu-no <(1 to 28 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [odu-no <(1 to 28 StepSize 1)> ] | The number of the ODU<br>Specify a value for this parameter if you want to display the reserved parameters of a specific ODU. Do not specify a value for this parameter if you want to display the reserved parameters of all ODUs. | Optional | N/A | 1-28 |

**Display Format**

(for each existing ODU object if requested for all ODUs)

```
ODUNo.                                  :<value>
ReservedParameter1                      :<value>
ReservedParameter2                      :<value>
ReservedParameter3                      :<value>
ReservedParameter4                      :<value>
ReservedParameter5                      :<value>
ReservedParameter6                      :<value>
ReservedParameter7                      :<value>
ReservedParameter8                      :<value>
ReservedParameter9                      :<value>
```

| Command Modes | Global command mode |
|---|---|

## 4.5.2 Configuring ODU Ports

Up to four ODU Ports, numbered 1 to 4, can be created and configured for each ODU. However, for a 1by1 ODU only port number 1 is meaningful. For a 2by1 ODU only ports 1 and 2 are meaningful.

**To configure an ODU Port:**

1. Enable the ODU Port configuration mode for the selected ODU Port (refer to Section 4.5.2.1)
2. You can now execute any of the following tasks:
   - Configure one or more of the ODU Port parameters (refer to Section 4.5.2.2)
   - Restore the default value of the txpower-onoff parameter (refer to Section 4.5.2.3)
3. Terminate the ODU Port configuration mode (refer to Section 4.5.2.4)

In addition, you can, at any time, display configuration and status information for each or all of the ODU Ports (refer to Section 4.5.2.6) or delete an existing ODU Port (refer to Section 4.5.2.5).

### 4.5.2.1 Enabling the ODU Port Configuration Mode\Creating an ODU Port

To configure the parameters of an ODU Port, first enable the ODU Port configuration mode for the specific ODU Port. Run the following command to enable the ODU Port configuration mode for an existing ODU Port:

**npu (config)# odu-port** <(1 to 28 StepSize 1)> <(1 to 4 StepSize 1)>

To create a new ODU Port, the mandatory txpower parameter must be specified. Run the following command to create a new ODU Port and enable the configuration mode for this ODU Port:

**npu (config)# odu-port** <(1 to 28 StepSize 1)> <(1 to 4 StepSize 1)> **txpower** <(0 to 46 StepSize 0.1)>

A new ODU Port is created with default values for the txpower-onoff parameter. For example, to create Port 1 in ODU 1 with a configured Tx Power of 34 dBm, and enable the parameters configuration mode for this ODU Port run the following command:

**npu (config)# odu-port 1 1 txpower 34**

After enabling the configuration mode for an ODU Port you can execute any of the following tasks:

- Configure one or more of the parameters of the ODU Port (refer to Section 4.5.2.2)
- Restore the default value of the txpower-onoff parameter (refer to Section 4.5.2.3)

After executing the above tasks, you can terminate the ODU Port configuration mode (refer to Section 4.5.2.4) and return to the global configuration mode.

**Command Syntax**

**npu (config)# odu-port** <(1 to 28 StepSize 1)> <(1 to 4 StepSize 1)> [**txpower** <(0 to 46 StepSize 0.1)>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 28 StepSize 1)> | The ODU number | Mandatory | N/A | 1-28 |
| <(1 to 4 StepSize 1)> | The Port number. | Mandatory | N/A | 1-4 |

| | | | | | |
|---|---|---|---|---|---|
| | [txpower <(0 to 46 StepSize 0.1)>] | The required tx power at the specified ODU Port, in dBm.<br>The actually available range depends on ODU Type: The upper limit is set by the Maximum Tx Power supported by the ODU (see "Currently Available Single Port ODU Types" on page 466). The control range for all ODUs is 10dBm, except to the following ODUs whose control range is 6dBm: oDU23002360000N361by1N0, oDU24962602000N361by1N0, oDU25902690000N361by1N0, oDU23052360000N361by1Y0 | Mandatory for a new ODU Port | N/A | 0 to 46 in increments of 0.1 |

**Command Modes** Global configuration mode

**NOTE**

The following examples are for odu-1, port-1 configuration mode.

### 4.5.2.2 Configuring ODU Port Parameters

After enabling the ODU Port configuration mode you can configure the transmit power parameters of the port.

To configure the ODU Port parameters, run the following command:

**`npu(config-odu-port-1-1)# params`** [txpower <(0 to 46 StepSize 0.1)> ] [txpower-onoff {on | off} ]

**NOTE**

You can display configuration information for the ODU Port parameters. For details, refer to Section 4.5.2.6.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

```
npu(config-odu-port-1-1)# params [txpower <(0 to 46 StepSize 0.1)>] [txpower-onoff {on | off} ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [txpower <(0 to 46 StepSize 0.1)>] | The transmit power at the ODU Port, in dBm. | Optional | As configured previouslu | 0 to 46 in increments of 0.1<br>Actual range depends on ODU type. |
| [txpower-onoff {on \| off} ] | Enables or disables transmissions on this port. | Optional | on | ■ on<br>■ off |

**Command Modes**

odu-port configuration mode

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

### 4.5.2.3 Restoring Default Values for ODU Port Parameters

After enabling the ODU Port configuration mode you can restore the default values for the txpower-onoff parameter:

To restore the default values for the txpower-onoff parameter, run the following command:

```
npu(config-odu-port-1-1)# no params
```

The txpower-onoff parameter will be restored to its default value (on), while the mandatory txpower parameter will remain unchanged.

| | |
|---|---|
| **Command Syntax** | **npu(config-odu-port-1-1)# no params** |
| **Privilege Level** | 10 |
| **Command Modes** | odu-port configuration mode |

### 4.5.2.4 Terminating the ODU Port Configuration Mode

Run the following command to terminate the ODU Port configuration mode:

**npu(config-odu-port-1-1)# exit**

| | |
|---|---|
| **Command Syntax** | **npu(config-odu-port-1-1)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | odu-port configuration mode |

### 4.5.2.5 Deleting an ODU Port

Run the following command to delete an ODU Port:

**npu(config)# no odu-port** <(1 to 28 StepSize 1)> <(1 to 4 StepSize 1)>

**IMPORTANT**

An associated ODU Port (specified in a Sector Association) cannot be deleted.

| | |
|---|---|
| **Command Syntax** | **npu(config)# no odu-params** <(1 to 28 StepSize 1)> <(1 to 4 StepSize 1)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 28 StepSize 1)> | The ODU number | Mandatory | N/A | 1-28 |
| <(1 to 4 StepSize 1)> | The Port number | Mandatory | N/A | 1-4 |

**Command Modes**

Global configuration mode

### 4.5.2.6 Displaying Configuration and Status Information for ODU Ports

To display configuration and status information of a specific or all ODU Ports, run the following command:

**npu# show odu-port** [odu-no <(1 to 28 StepSize 1)> port-no <(1 to 4 StepSize 1)>]

Specify the ODU number (1-28) and Port number (1-4) if you want to display configuration and status information for a particular ODU Port. Do not specify values for these parameters if you want to view configuration and status information for all existing ODU Ports.

**Command Syntax**

**npu# show odu-port** [odu-no <(1 to 28 StepSize 1)> port-no <(1 to 4 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [odu-no <(1 to 28 StepSize 1)> ] | The number of the ODU<br><br>Specify a value for this parameter if you want to display the parameters of a specific ODU Port. Do not specify a value for this parameter if you want to display the general parameters of all ODU Ports. | Optional | N/A | 1-28 |

| | | | | | |
|---|---|---|---|---|---|
| | [port-no <(1 to 4 StepSize 1)> ] | The number of the Port<br><br>Specify a value for this parameter if you want to display the parameters of a specific ODU Port. Do not specify a value for this parameter if you want to display the general parameters of all ODU Portss. | Optional | N/A | 1-4 |

**Display Format**

(for each existing ODU Port if requested for all ODU Ports)

```
ODUNo.                    :<value>
ODUPortNo                 :<value>
TxPower(dBm)              :<value>
TxEnable                  :<value>
HWVersion                 :<value>
HWRevision                :<value>
HPACard                   :<value>
HPAHWVersion              :<value>
HC08SWVersion             :<value>
CPLDSWVersion             :<value>
SerialNumber              :<value>
txpower-status            :<value>
```

**Command Modes**

Global command mode

In addition to the configurable parameters, the following status parameters are also displayed:

| Parameter | Description | Possible Values |
|---|---|---|
| HWVersion | HW version no. of ODU basic card connected to this port | <number> |
| HWRevision | HW revision no. of ODU basic card connected to this port | <number> |
| HPACard | Indicates whether the port is connected to an HPA card | ■ installed (1)<br><br>■ notInstalled (0) |

| | | |
|---|---|---|
| HPAHWVersion | HW version no. of HPA connected to this port (relevant only if HPACard is installed) | <number> |
| HC08SWVersion | SW version of HC08 controlling card connected to this port | <string> |
| CPLDSWVersion | SW version of CPLD controlling card connected to this port | <string> |
| SerialNumber | Serial number of ODU basic card connected to this port | <number> |
| txpower-status | The operation status of the port | <enabled/disabled> |

# 4.6 Managing Antennas

Up to 28 Antenna objects, identified by the Antenna number (1-28), can be created and configured.

**To configure an Antenna:**

1. Enable the Antenna configuration mode for the selected Antenna (refer to Section 4.6.1)
2. You can now execute any of the following tasks:
   - » Configure one or more of the Antenna parameters (Section 4.6.2)
   - » Restore the default value of some or all of the Antenna parameters (refer to Section 4.6.3)
3. Terminate the Antenna configuration mode (refer to Section 4.6.4)

In addition, you can, at any time, display configuration information for one or all of the Antennas (refer to Section 4.6.6) or delete an existing Antenna (refer to Section 4.6.5).

## 4.6.1 Enabling the Antenna Configuration Mode\Creating an Antenna

To configure the parameters of an Antenna, first enable the Antenna configuration mode for the specific Antenna. Run the following command to enable the Antenna configuration mode for an existing Antenna:

**npu (config)# antenna** <(1 to 28 StepSize 1)>

To create a new Antenna, the mandatory heading parameter must be specified. Run the following command to create a new Antenna and enable the configuration mode for this Antenna:

**npu (config)# antenna** <(1 to 28 StepSize 1)> **heading** <(0 to 359 StepSize 1)>

A new Antenna is created with default values for all other parameters.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

For example, to create Antenna 1 with a configured heading of 90 degrees and enable the parameters configuration mode for this Antenna, run the following command:

**npu (config)# antenna 1 heading 90**

**CAUTION**

When an antenna is associated to a sector, the antenna heading must be the same as the sector heading for every antenna associated to the sector.

After enabling the configuration mode for an Antenna you can execute any of the following tasks:

- Configure one or more of the parameters of the Antenna (refer to Section 4.6.2)
- Restore the default value of the non-mandatory parameters parameter (refer to Section 4.6.3)

After executing the above tasks, you can terminate the Antenna configuration mode (refer to Section 4.6.4) and return to the global configuration mode.

**Command Syntax**

**npu (config)# antenna** <(1 to 28 StepSize 1)> [**heading** <(0 to 359 StepSize 1)>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 28 StepSize 1)> | The ODU number | Mandatory | N/A | 1-28 |

| | | | | | |
|---|---|---|---|---|---|
| | [heading <(0 to 359 StepSize 1)>] | Indicates the azimuth angle (in degrees) between the center of the horizontal antenna beamwidth and the true north; counting clockwise. | Mandatory for a new Antenna | N/A | 0 to 359 |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

**NOTE**

The following examples are for antenna-1 configuration mode.

## 4.6.2 Configuring Antenna Parameters

After enabling the Antenna configuration mode you can configure the Antenna parameters.

To configure the Antenna parameters, run the following command:

**npu(config-antenna-1)# params** [antenna-type <string (32)> ] [no-of-ports <(1 to 8 StepSize 1)> ] [gain <(0 to 60 StepSize 0.1)> ] [mechanical-downtilt <(-90 to 90 StepSize 0.1)> ] [electrical-downtilt <(-90 to 90 StepSize 0.2)> ] [electrical-azimuth-adjustment <(-90 to 90 StepSize 0.3)> ] [longitude <longitude> ] [latitude <latitude> ] [tower-height <(0 to 500 StepSize 1)> ] [altitude <(-500 to 10000 StepSize 1)> ] [heading <(0 to 359 StepSize 1)> ] [beamwidth <(0 to 359 StepSize 1)> ] [cable-loss <(0 to 20 StepSize 0.1)> ]

| | |
|---|---|
| **Command Syntax** | **npu(config-antenna-1)# params** [antenna-type <string (32)> ] [no-of-ports <(1 to 8 StepSize 1)> ] [gain <(0 to 60 StepSize 0.1)> ] [mechanical-downtilt <(-90 to 90 StepSize 0.1)> ] [electrical-downtil <(-90 to 90 StepSize 0.2)> ] [electrical-azimuth-adjustment <(-90 to 90 StepSize 0.3)> ] [longitude <longitude> ] [latitude <latitude> ] [tower-height <(0 to 500 StepSize 1)> ] [altitude <(-500 to 10000 StepSize 1)> ] [heading <(0 to 359 StepSize 1)> ] [beamwidth <(0 to 359 StepSize 1)> ] [cable-loss <(0 to 20 StepSize 0.1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [antenna-type <string (32)> ] | Antenna type to be populated manually for inventory information only | Optional | N/A | String (up to 32 printable characters) |
| [no-of-ports <(1 to 8 StepSize 1)> ] | The number of antenna ports | Optional | 1 | 1-8 |
| [gain <(0 to 60 StepSize 0.1)> ] | Antenna Gain (in dB) | Optional | 17 | 0-60 in steps of 0.1 |
| [mechanical-downtilt <(-90 to 90 StepSize 0.1)> ] | Downwards mechanical tilt of the antenna (in degrees) as opposed to the electrical tilt already integrated in the antenna (and thus taken as reference; instead of the horizontal plane) | Optional | 0 | -90.0 to 90.0 in steps of 0.1 |
| [electrical-downtil <(-90 to 90 StepSize 0.1)> ] | Downwards electrical tilt of the antenna, in degrees | Optional | 0 | -90.0 to 90.0 in steps of 0.1 |
| [electrical-azimuth-adjustment <(-90 to 90 StepSize 0.1)> ] | Electrical azimuth adjustment of the antenna, in degrees (in a clockwise direction) | Optional | 0 | -90.0 to 90.0 in steps of 0.1 |
| [longitude <longitude> ] | The longitude of the antenna.<br>The recommended format is lll.mmm.a where lll.mmm is the longitude in degrees (lll - between 000 and 180, mmm - between 000 and 999), a is E (East) or W (West). | Optional | 000.000; E | String |
| [latitude <latitude> ] | The latitude of the antenna.<br>The recommended format is lll.mmm.a where lll.mmm is the longitude in degrees (lll - between 000 and 180, mmm - between 000 and 999), a is N (North) or S (South). | Optional | 000.000; E | String |
| [tower-height <(0 to 500 StepSize 1)> ] | Defines the height of the antenna above the ground in meters. | Optional | 0 | 0-500 |

| | | | | | |
|---|---|---|---|---|---|
| | [altitude <(-500 to 10000 StepSize 1)> ] | Absolute altitude of the sector (above sea level) in meters. | Optional | | -500 to 10000 |
| | [heading <(0 to 359 StepSize 1)> ] | Indicates the azimuth angle (in degrees) between the center of the horizontal antenna beamwidth and the true north; counting clockwise. | Optional | | 0-359 |
| | [beamwidth <(0 to 359 StepSize 1)> ] | Beamwidth of the antenna in degrees | Optional | 60 | 0-359 |
| | [cable-loss <(0 to 20 StepSize 0.1)> ] | The attenuation (in dB) of the cable between the ODU port and antenna port (informative only) | Optional | 0.5 | 0-20 in steps of 0.1 |

**Command Modes** antenna configuration mode

**NOTE**

You can display configuration information for the Antenna parameters. For details, refer to Section 4.6.6.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

## 4.6.3 Restoring Default Values for Antenna Parameters

After enabling the Antenna configuration mode you can restore the default values for some or all of the parameters (excluding the mandatory heading parameter).

To restore one or several Antenna parameters do their default value, run the following command:

```
npu(config-antenna-1)# no params [antenna-type] [no-of-ports]
[gain] [mechanical-downtilt] [electrical-downtil]
[electrical-azimuth-adjustment] [longitude] [latitude]
[tower-height] [altitude] [beamwidth] [cable-loss]
```

You can restore one or several parameters to the default value(s) by specifying only those parameter. For example, to restore only the mechanical-downtilt and electrical-downtilt to their default values, run the following command:

```
npu(config-antenna-1)# no params mechanical-downtilt
electrical-downtil
```

The mechanical-downtilt and electrical-downtilt will be restored to their default values, while all other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

```
npu(config-antenna-1)# no params
```

**NOTE**

Refer to Section 4.6.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-antenna-1)# no params** [antenna-type] [no-of-ports] [gain] [mechanical-downtilt] [electrical-downtil] [electrical-azimuth-adjustment] [longitude] [latitude] [tower-height] [altitude] [beamwidth] [cable-loss] |
| **Privilege Level** | 10 |
| **Command Modes** | antenna configuration mode |

## 4.6.4 Terminating the Antenna Configuration Mode

Run the following command to terminate the Antenna configuration mode:

```
npu(config-antenna-1)# exit
```

| | |
|---|---|
| **Command Syntax** | **npu(config-antenna-1)# exit** |
| **Privilege Level** | 10 |

**Command Modes** antenna configuration mode

## 4.6.5 Deleting an Antenna

Run the following command to delete an Antenna:

**npu(config)# no antenna** <(1 to 28 StepSize 1)>

**IMPORTANT**

An associated Antenna (specified in a Sector Association) cannot be deleted..

**Command Syntax** **npu(config)# no antenna** <(1 to 28 StepSize 1)>

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 28 StepSize 1)> | The Antenna number | Mandatory | N/A | 1-28 |

**Command Modes** Global configuration mode

## 4.6.6 Displaying Configuration Information for Antennas

To display configuration information of a specific or all Antennas, run the following command:

**npu# show antenna** [antenna-no <(1 to 28 StepSize 1)> ]

Specify the Antenna number (1-28) if you want to display configuration information for a particular Antenna. Do not specify values for this parameter if you want to view configuration information for all existing Antennas.

**Command Syntax**

**npu# show antenna** [antenna-no <(1 to 28 StepSize 1)>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [antenna-no <(1 to 28 StepSize 1)> ] | The number of the Antenna<br><br>Specify a value for this parameter if you want to display the parameters of a specific Antenna. Do not specify a value for this parameter if you want to display the parameters of all Antennas. | Optional | N/A | 1-28 |

**Display Format**

(for each existing Antenna if requested for all Antennas)

```
AntennaNo.                                  :<value>
AntennaType                                 :<value>
No.ofPorts                                  :<value>
Gain(dB)                                    :<value>
MechanicalDownTilt(degrees)                 :<value>
ElectricalDownTilt(degrees)                 :<value>
ElectricalAzymuthAdjustment(degrees)        :<value>
Longtitude                                  :<value>
Latitude                                    :<value>
TowerHeight(meters)                         :<value>
Altitude(meters)                            :<value>
AntennaHeading(degrees)                     :<value>
AntennaBeamWidth(degrees)                   :<value>
CableLoss(dB)                               :<value>
```

| | |
|---|---|
| **Command Modes** | Global command mode |

# 4.7 Managing BSs

Up to 28 different BSs can be defined.

The full configuration of each BS includes multiple components (tables). Many of these tables include one or more mandatory parameters (parameters with no default value). The creation of a new BS is not completed until all mandatory parameters have been configured.

For each table that has only optional (non-mandatory) parameters, at least one parameter must be configured explicitly (even if not changed from the default value) when creating a new BS.

Due to the complicated structure of the BS object and the high number of mandatory parameters in different tables, a special **apply** command must be executed for properly completing the configuration of certain tables. The **apply** command must be executed before exiting the applicable configuration mode. Failure to execute the **apply** command will result in loss of the newly configured parameters. Wherever required, the need to use the **apply** command will be indicated in the manual.

The following table lists the tasks for configuring a BS, indicating the applicable mandatory parameters and the need to execute the **apply** command where applicable. When configuring a new BS, verify that all mandatory parameters have been configured (otherwise a trial to associate the BS to a Sector will fail):

**Table 4-48: Tasks for Configuring a BS**

| Task | Mandatory Parameters | apply required |
|---|---|---|
| “Enabling the BS Configuration Mode\Creating a BS Object” on page 497 | bs id | No |
| “Managing BS General Parameters” on page 499 | | No |
| “Managing BS Services” on page 502 | service name (type) | Yes |

**Table 4-48: Tasks for Configuring a BS**

| | | |
|---|---|---|
| "Managing Service Mapping Rules" on page 508 | service mapping rule index<br>srvc (service-name)<br>order<br>r1 profile parameters:<br>■ datadelivery-type<br>■ priority<br>■ mir<br>■ cir<br>■ jitter<br>■ latency<br>■ sdu-size<br>■ grant-interval | Yes |
| "Managing Power Control Levels and Policies" on page 528 | | Yes |
| "Managing BS Feedback Allocation Parameters" on page 559 | max-cqi | No |
| "Managing Neighbor Advertisement Parameters" on page 563 | | No |
| "Managing Triggers Parameters" on page 566 | | No |
| "Managing Trigger Setup Parameters" on page 570 | | No |
| "Managing Scan Negotiation Parameters" on page 574 | | No |
| "Managing Handover Negotiation at SBS Parameters" on page 578 | | No |

**Table 4-48: Tasks for Configuring a BS**

| | | |
|---|---|---|
| “Managing Neighbor BSs” on page 585 | General Parameters:<br>■ eirp<br>■ bw<br>■ feedbackzone-permbase<br>■ ucd-configchangecount<br>■ dcd-configchangecount<br>■ frequency<br>■ restartcount<br>■ preamble-idx | Yes |
| “Managing UCD Parameters” on page 608 | | No |
| “Managing DCD Parameters” on page 612 | | No |
| “Managing the RF Frequency Parameter” on page 616 | frequency | No |
| “Managing the Baseband Bandwidth Parameter” on page 619 | bandwidth | No |

**Table 4-48: Tasks for Configuring a BS**

| | | |
|---|---|---|
| “Managing Airframe Structure Parameters” on page 621 | General Parameters:<br>■ cell-id<br>■ segment<br>■ frame-offset<br>■ ul-dl-allocation<br>Map Zone Parameters:<br>■ majorgrps<br>Uplink Feedback Zone Parameters:<br>■ permbase<br>Downlink Data Zone:<br>■ subchannels<br>■ permbase<br>Uplink Data Zone:<br>■ subchannels | Yes |
| “Managing Rate Adaptation Parameters” on page 662 | | No |
| “Managing BS Bearer Interface Parameters” on page 671 | ip-address<br>ip-subnetmask<br>dflt-gw | No |
| “Managing Authentication Relay Parameters” on page 674 | dflt-auth-ip-address | No |
| “Managing Handover Control Parameters” on page 679 | | No |
| “Managing Bearer Traffic QoS Marking Rules” on page 683 | enable-srvcflow-mediaflowtype<br>srvcflow-mediaflowtype (if enable-srvcflow-mediaflowtype is set to True) | Yes |
| “Managing Control Traffic QoS Marking Rules” on page 691 | | Yes |

**Table 4-48: Tasks for Configuring a BS**

| | | |
|---|---|---|
| "Managing BS Management Alarm Thresholds Parameters" on page 700 | | No |
| "Managing ID-IP Mapping Parameters" on page 704 | nw-node-id (Next Hop BS ID)<br>nw-node-ip | No |
| "Managing Ranging Parameters" on page 707 | | Yes |
| "Managing Alarm Threshold Parameters" on page 729 | | No |
| "Managing BS Reserved Parameters" on page 735 | | No |

## 4.7.1 Enabling the BS Configuration Mode\Creating a BS Object

To configure the parameters of a BU, first enable the BS configuration mode for the specific BS. Run the following command to enable the BS configuration mode. You can also use this command to create a new BS object. Note that for a new object this command only defines the BS ID, and that the BS is not fully created until completing configuration of all mandatory parameters.

The BS ID is the unique identifier of the BS in the access network. The BS ID used in the system is in the format A.B.C where A, B, C are from 0 to 255. The BS ID used in the CLI is an integer that is calculated by the formula A*65536+B*256+C. For example, a BS ID of 1.2.5 is translated to 1*65536+2*256+5=66053.

```
npu(config)# bs <(1 to 16777215 StepSize 1)>
```

For example, to configure BS 66053, run the following command:

```
npu (config)# bs 66053
```

**IMPORTANT**

An error occurs if you specify BS ID that is not in the range, 1-16777215.

If you use this command to create a new BS, the configuration mode for this BS is automatically enabled, after which you can execute any of the following tasks:

- Configure one or more of the parameters tables of the BS
- Restore the default values for the non-mandatory parameters of one or more of the parameters tables of the BS

After executing the above tasks, you can terminate the BS configuration mode (refer to Section 4.4.4) and return to the global configuration mode. From the global configuration mode you can delete an existing BS (refer to). You can display configuration information for selected tables from the global command mode.

**Command Syntax**

**npu(config)# bs** <(1 to 16777215 StepSize 1)>

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The unique ID (BSIDLSB) of the BS. Must be unique in the radio access network. A number in the range from 1 to 16,777,215 (a 24-bit value that can be represented as A.B.C where A, B, C are from 0 to 255). | Mandatory | N/A | 1 to 16777215 |

**Command Modes**

Global configuration mode

**NOTE**

The following examples are for bs configuration mode for bs-66053 .

## 4.7.2 Deleting a BS

Run the following command to delete a BS:

**npu(config)# no bs** <(1 to 16777215 StepSize 1)>

**IMPORTANT**

An associated bs (specified in an associated sector) cannot be deleted.

| | |
|---|---|
| **Command Syntax** | npu(config)# no bs <(1 to 16777215 StepSize 1)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The unique ID (BSIDLSB) of the BS. | Mandatory | N/A | 1 to 16777215 |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

## 4.7.3 Managing BS General Parameters

The general parameters of a BS include the Operator ID and the BS Name.

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the general parameters (refer to Section 4.7.3.1).
- Restore the default values of one or all of the general parameters (refer to Section 4.7.3.2).

You can display configuration information for the general parameters of a selected or all existing BSs (refer to Section 4.7.3.3).

### 4.7.3.1 Configuring BS General Parameters

**To configure the BS General Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# general** [operator-id <(1 to 16777215 StepSize 1)> ] [bs-name <string (32)> ]

**IMPORTANT**

When creating a new BS, at least one of the BS General parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053)# general [operator-id <(1 to 16777215 StepSize 1)> ] [bs-name <string (32)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [operator-id <(1 to 16777215 StepSize 1)>] | A unique operator identifier. The same Operator ID must be used throughout the radio access network. (a 24-bit value that can be represented as A.B.C where A, B, C are from 0 to 255) | Optional | 16773929 | 1 to 16777215 |
| [bs-name <string (32)>] | BS name | Optional | empty string | A string of up to 32 printable characters. |

**Command Modes**

bs configuration mode

## 4.7.3.2 Restoring Default Values for BS General Parameters

After enabling the BS configuration mode you can restore the default values for one or all of the general BS parameters.

To restore one or all general BS parameters do their default value, run the following command:

```
npu(config-bs-66053)# no general [operator-id] [bs-name]
```

You can restore one parameter to its default value by specifying only that parameter. For example, to restore only the operator-id to its default value, run the following command:

**npu(config-bs-66053)# no general operator-id**

The operator-id will be restored to its default value, while the bs-name parameter will remain unchanged.

To restore all parameters to their default value, run the following command:

**npu(config-bs-66053)# no general**

**NOTE**

Refer to Section 4.7.3.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no general** [operator-id] [bs-name] |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.3.3 Displaying Configuration Information for BS General Parameters

To display configuration information of the general parameters of a specific or all BSs, run the following command:

**npu# show general bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID (1-16777215) of an existing BS if you want to display configuration information for a particular BS. Do not specify values for this parameter if you want to view configuration information for all existing BSs.

| | |
|---|---|
| **Command Syntax** | **npu# show general bs** [<(1 to 16777215 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [<(1 to 16777215 StepSize 1)> ] | The BS ID<br><br>Specify a value for this parameter if you want to display the general parameters of a specific BS. Do not specify a value for this parameter if you want to display the general parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                 :<value>
OperatorID              :<value>
BSName                  :<value>
```

**Command Modes**

Global command mode

## 4.7.4 Managing BS Services

The BS Service parameters affect the properties of the HARQ mechanism for each Service.

### 4.7.4.1 Enabling the BS Service Configuration Mode\Creating a BS Service

To configure the parameters of a BS Service, first enable the BS service configuration mode for the specific service. Run the following command to enable the BS service configuration mode. You can also use this command to create a new service with default values.

```
npu(config-bs-66053)# service <(string (32)1)>
```

For example, to define a new service named video, or to enable the configuration mode for an existing service named video, run the following command:

```
npu(config-bs-66053)# service video
```

If you use this command to create a new service, the configuration mode for this service is automatically enabled, after which you can execute any of the following tasks:

- Configure the parameters of the service (refer to Section 4.7.4.2)
- Restore the default values for the non-mandatory parameters of the service (refer to Section 4.7.4.3)

After executing the above tasks, you can terminate the BS Service configuration mode (refer to Section 4.7.4.4) and return to the BS configuration mode. From the BS configuration mode you can delete an existing service (refer to Section 4.7.4.5). You can display configuration information for BS services from the global command mode (refer to Section 4.7.4.6).

Note that for properly completing the configuration of a service the **apply** command must be executed prior to exiting the BS Service configuration mode.

**Command Syntax**

```
npu(config-bs-66053)# service <(string (32)1)>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(string (32)1)> | The Service name (type). | Mandatory | N/A | A string of up to 32 characters. |

**Command Modes**

bs configuration mode

## 4.7.4.2 Configuring Service Parameters

**To configure the BS Service Parameters:**

From the BS configuration mode, run the following command:

```
npu(config-bs-66053-service-video)# def [max-dl-rtx <(0 to 15
StepSize1)> ] [max-ul-rtx <(0 to 15 StepSize 1)> ] [max-subburst
```

```
<(0 to 1500 StepSize 1)> ] [trgt-err-rate <(0.1 to 10 StepSize
0.1)> ]
```

**IMPORTANT**

When creating a new Service, at least one of the Service parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-service-video)# def [max-dl-rtx <(0 to 15
StepSize1)> ] [max-ul-rtx <(0 to 15 StepSize 1)> ] [max-subburst
<(0 to 1500 StepSize 1)> ] [trgt-err-rate <(0.1 to 10 StepSize
0.1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [max-dl-rtx <(0 to 15 StepSize1)> ] | The maximal number of downlink retransmissions of an HARQ sub-burst for this servic | Optional | 5 | 0 -15i |
| [max-ul-rtx <(0 to 15 StepSize 1)> ] | The maximal number of uplink retransmissions of an HARQ sub-burst for this service | Optional | 5 | 0 - 15 |
| [max-subburst <(0 to 1500 StepSize 1)> ] | The maximal size of a sub-burst in bytes for this service | Optional | 600 | 0 - 1500 |
| [trgt-err-rate <(0.1 to 10 StepSize 0.1)>] | The target sub-burst error rate for this service | Optional | 1 | 0.1 to 10 in steps of 0.1 |

**Command Modes**

bs service configuration mode

### 4.7.4.3 Restoring Default Values for BS Service Parameters

After enabling the BS Service configuration mode you can restore the default values for some or all of the non-mandatory parameters.

To restore one or several BS Service parameters do their default value, run the following command:

```
npu(config-bs-66053-service-video)# no def [max-dl-rtx ]
[max-ul-rtx ] [max-subburst ] [trgt-err-rate ]
```

You can restore one or several parameters to the default value(s) by specifying only those parameter. For example, to restore only the max-dl-rtx and max-ul-rtx parameters to their default values, run the following command:

```
npu(config-bs-66053-service-video)# no def max-dl-rtx max-ul-rtx
```

The max-dl-rtx and max-ul-rtx parameters will be restored to their default values, while all other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

```
npu(config-bs-66053-service-video)# no def
```

**NOTE**

Refer to Section 4.7.4.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-service-video)# no def** [max-dl-rtx ] [max-ul-rtx ] [max-subburst ] [trgt-err-rate ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs service configuration mode |

## 4.7.4.4 Terminating the BS Service Configuration Mode

Run the following command to terminate the BS Service configuration mode:

```
npu(config-bs-66053-service-video)# exit
```

**IMPORTANT**

Do not forget to execute the apply command before terminating the BS Service configuration mode:

```
npu(config-bs-66053-service-video)# apply
```

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-service-video)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | bs service configuration mode |

### 4.7.4.5 Deleting a BS Service

Run the following command from the BS configuration mode to delete a BS Service:

**npu(config-bs 66053)# no service** <string (32)>

| | |
|---|---|
| **Command Syntax** | **npu(config-bs 66053)# no service** <string (32)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<string (32)>` | The Service name | Mandatory | N/A | String |

| | |
|---|---|
| **Command Modes** | bs service configuration mode |

### 4.7.4.6 Displaying Configuration Information for BS Service

To display configuration information of a specific or all BS Services, run the following command:

**npu# show service bs** [<(1 to 16777215 StepSize 1)> service-name <string (32)>]

Specify the BS ID and Service name if you want to display configuration information for a particular Service. Do not specify values for these parameter if you want to view configuration information for all existing BS Services.

**Command Syntax**

npu# show service bs [<(1 to 16777215 StepSize 1)> service-name <string (32)>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the parameters of a specific BS Service. Do not specify a value for this parameter if you want to display the parameters of all BS Services. | Optional | N/A | 1-16777215 |
| <string (32)> | The Service name<br>Specify a value for this parameter if you want to display the parameters of a specific BS Service. Do not specify a value for this parameter if you want to display the parameters of all BS Services. | Optional | N/A | String |

**Display Format**

(for each existing Antenna if requested for all Antennas)

```
BSIDLSB                                  :<value>
ServiceName                              :<value>
MaximumDownlinkRetransmissions           :<value>
MaximumUplinkRetransmissions             :<value>
MaximumSub-BurstSize(bytes)              :<value>
TargetPacketErrorRate(%)                 :<value>
```

**Command Modes**

Global command mode

## 4.7.5 Managing Service Mapping Rules

Up to 255 Service Mapping Rule may be defined.

**To configure a Service Mapping Rule:**

1. Enable the BS Service Mapping Rule configuration mode for the selected Service Mapping Rule (refer to Section 4.7.5.1)
2. You can now execute any of the following tasks:
   - Configure one or more of the parameters tables of the Service Mapping Rule (refer to Section 4.7.5.2)
   - Restore the default values of parameters in one or more of the parameters tables of the Service Mapping Rule (refer to Section 4.7.5.3)
   - Terminate the Service Mapping Rule configuration mode (refer to Section 4.7.5.4)

In addition, you can, at any time, display configuration information for each of the parameters tables of the Service Mapping Rule (refer to Section 4.7.5.6) or delete an existing Service Mapping Rule (refer to Section 4.7.5.5).

### 4.7.5.1 Enabling the Service Mapping Rule Configuration Mode\Creating a Service Mapping Rule

To configure the parameters of a Service Mapping Rule, first enable the BS Service Mapping Rule configuration mode for the specific Service Mapping Rule. Run the following command to enable the BS Service Mapping Rule configuration mode. You can also use this command to create a new Service Mapping Rule.

Note that for a new Service Mapping Rule this command only defines the Service Mapping Rule index, and that the Service Mapping Rule is not fully created until completing configuration of all mandatory parameters and executing the **apply** command (must be executed before exiting the BS Service Mapping Rule configuration mode). Also when updating an existing Service Mapping Rule, the **apply** command must be executing prior to termination the Service Mapping Rule configuration mode.

```
npu(config-bs-66053)# srvcmaprule <(1 to 255 StepSize 1)
```

For example, to define a new Service Mapping Rule index 1, or to enable the configuration mode for Service Mapping Rule 1, run the following command:

**npu(config-bs-66053)# srvcmaprule 1**

If you use this command to create a new Service Mapping Rule, the configuration mode for this Service Mapping Rule is automatically enabled, after which you can execute any of the following tasks:

- Configure one or more of the parameters tables of the Service Mapping Rule (refer to Section 4.7.5.2)
- Restore the default values of parameters in one or more of the parameters tables of the Service Mapping Rule (refer to Section 4.7.5.3)

After executing the above tasks, you can terminate the Service Mapping Rule configuration mode (refer to Section 4.7.5.4) and return to the BS configuration mode.

Note that for properly completing the configuration of a Service Mapping Rule the **apply** command must be executed prior to exiting the BS Service Mapping Rule configuration mode.

**Command Syntax**

**npu(config-bs-66053)# srvcmaprule** <(1 to 255 StepSize 1)>

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| **srvcmaprule** <(1 to 255 StepSize 1)> | The Service Mapping Rule index | Mandatory | | 1 - 255 |

**Command Modes**

BS configuration mode

For example, to define Service Mapping Rule 1 for BS 66053, run the following command:

**npu(config-bs-66053)# srvcmaprule 1**

**NOTE**

The following examples are for BS Service Mapping Rule configuration mode for bs-66053, service mapping rule (srvcmaprule)-1..

### 4.7.5.2 Configuring Service Mapping Rule Parameters

After enabling the Service Mapping Rule configuration mode you can configure the following parameters tables:

- General (refer to Section 4.7.5.2.1)
- Order (refer to Section 4.7.5.2.2)
- R1 Profile (refer to Section 4.7.5.2.3)
- R6 Profile (refer to Section 4.7.5.2.4)

**IMPORTANT**

After completing the Service Mapping Rule configuration,do not forget to execute the apply command before exiting the BS Service Mapping Rule configuration mode:

**npu(config-bs-66053-srvcmaprule-1)# apply**

#### 4.7.5.2.1 Configuring General Service Mapping Rule Parameters

The General Service Mapping Parameters table enables associating the Service Mapping Rule to a specific Service.

To configure the General Service Mapping Rule parameters, run the following command:

**npu(config-bs-66053-srvcmaprule-1)# general srvc** <string (32)>

**IMPORTANT**

When creating a new Service Mapping Rule, the mandatory srvc parameters must be configured.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-srvcmaprule-1)# general srvc** <string (32)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [srvc <string (32)> ] | The service type to which the connection will be mapped.<br>Must be the same as the name (type) configured for the relevant service (refer to Section 4.7.4). | Mandatory | | A string of up to 32 printable characters. |

**Command Modes**

bs service mapping rule configuration mode

#### 4.7.5.2.2 Configuring the Order Parameters

The Order Parameters table enables configuring the look-up-order parameter that defines the order in which conceptual rows of the table are checked to find a match.

To configure the Order parameters, run the following command:

**`npu(config-bs-66053-srvcmaprule-1)# order look-up-order <(1 to 255 StepSize 1)>`**

**IMPORTANT**

When creating a new Service Mapping Rule, the mandaory order parameter must be configured.

**Command Syntax**

**`npu(config-bs-66053-srvcmaprule-1)# order`** `[look-up-order <(1 to 255 StepSize 1)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | [look-up-order <(1 to 255 StepSize 1)> ] | Defines the order in which the conceptual rows of the table are checked to find a match.<br>**Note**: The value of this parameter must be different for each conceptual row instance | Mandatory | | 1 to 255 |

| | |
|---|---|
| **Command Modes** | bs service mapping rule configuration mode |

### 4.7.5.2.3 Configuring R1 Profile Parameters

To configure mapping rules to R1 Profile parameters, run the following command:

```
npu(config-bs-66053-srvcmaprule-1)# r1prof [modify-serviceqos
{TRUE | FALSE} ] [dfltpriority <(0 to 7 StepSize 1)> ]
[datadeliverytype {uGS | rTVR | nRTVR | bE | eRTVR} ] [priority <(0
to 7 StepSize 1)> ] [mir <(0 to 20000 StepSize 1)> ] [cir <(0 to
20000 StepSize 1)> ] [jitter <(0 to 5000 StepSize 1)> ] [latency
<(0 to 5000 StepSize 1)> ] [sdu-length {fixed | variable} ]
[sdu-size <(1 to 255 StepSize 1)> ] [grant-interval <(0 to 5000
StepSize 1)> ]
```

**IMPORTANT**

When creating a new Service Mapping Rule, all mandatory parameters must be configured.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-srvcmaprule-1)# r1prof** [modify-serviceqos {TRUE \| FALSE} ] [dfltpriority <(0 to 7 StepSize 1)> ] [datadeliverytype {uGS \| rTVR \| nRTVR \| bE \| eRTVR} ] [priority <(0 to 7 StepSize 1)> ] [mir <(0 to 20000 StepSize 1)> ] [cir <(0 to 20000 StepSize 1)> ] [jitter <(0 to 5000 StepSize 1)> ] [latency <(0 to 5000 StepSize 1)> ] [sdu-length{fixed \| variable} ] [sdu-size <(1 to 255 StepSize 1)> ] [grant-interval <(0 to 5000 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [modify-serviceqos {TRUE \| FALSE} ] | Indicates whether to modify service QoS parameters using internal R1 profile parameters. | Optional | FALSE | ■ TRUE<br>■ FALSE |
| [dfltpriority <(0 to 7 StepSize 1)> ] | Relevant only if modify-serviceqos is FALSE. Indicates the traffic priority to be used when it is missing in R6 request. | Optional | 0 | 0 to 7 |
| [datadeliverytype {uGS \| rTVR \| nRTVR \| bE \| eRTVR} ] | Relevant only if modify-serviceqos is TRUE. An internal R1 profile parameter, specifying the type of data delivery (service type).<br>(RTVR and NRTVR are not applicable for current release) | Mandatory when creating a new Service Mapping Rule. | N/A | ■ uGS<br>■ rTVR<br>■ nRTVR<br>■ bE<br>■ eRTVR |
| [priority <(0 to 7 StepSize 1)> ] | Relevant only if modify-serviceqos is TRUE and the datadeliverytype is rTVR, nRTVR, eRTVR or bE. An internal R1 profile parameter specifying the traffic priority. | Mandatory when creating a new Service Mapping Rule. | N/A | 0 to 7 |
| [mir <(0 to 20000 StepSize 1)> ] | Relevant only if modify-serviceqos is TRUE. An internal R1 profile parameter specifying the maximum sustained traffic rate in Kbps. | Mandatory when creating a new Service Mapping Rule. | N/A | 0 - 20000 |
| [cir <(0 to 20000 StepSize 1)> ] | Relevant only if modify-serviceqos is TRUE and the datadeliverytype is uGS, rTVR, nRTVR or eRTVR. An internal R1 profile parameter specifying the minimum reserved traffic rate in Kbps. | Mandatory when creating a new Service Mapping Rule. | N/A | 0 - 20000 |

| | | | | | |
|---|---|---|---|---|---|
| | [jitter <(0 to 5000 StepSize 1)> ] | Relevant only if modify-serviceqos is TRUE and the datadeliverytype is uGS or eRTVR. An internal R1 profile parameter specifying maximum tolerated jitter in milliseconds. | Mandatory when creating a new Service Mapping Rule. | N/A | 0 - 5000 |
| | [latency <(0 to 5000 StepSize 1)> ] | Relevant only if modify-serviceqos is TRUE and the datadeliverytype is uGS, rTVR or eRTVR. An internal R1 profile parameter specifying maximum latency in milliseconds. | Mandatory when creating a new Service Mapping Rule. | N/A | 0 - 5000 |
| | [sdu-length{fixed \| variable} ] | Relevant only if modify-serviceqos is TRUE and the datadeliverytype is uGS. An internal R1 profile parameter specifying whether SDU length is fixed or variable. In the current release only fixed length is supported. | Optional | fixed | ■ fixed<br>■ variable (not supported in current release) |
| | [sdu-size <(1 to 255 StepSize 1)> ] | Relevant only if modify-serviceqos is TRUE, the datadeliverytype is uGS and the sdu-length is fixed. An internal R1 profile parameter specifying the SDU size in bytes. | Mandatory when creating a new Service Mapping Rule. | N/A | 1 - 255 |
| | [grant-interval <(0 to 5000 StepSize 1)> ] | Relevant only if modify-serviceqos is TRUE and the datadeliverytype is uGS or eRTVR. An internal R1 profile parameter specifying the grant interval in milliseconds. | Mandatory when creating a new Service Mapping Rule. | N/A | 0 - 5000 |

**Command Modes** bs service mapping rule configuration mode

**IMPORTANT**

Note that when creating a new Service Mapping Rule all mandatory parameters must be configured, including those that may not be relevant for the Service Mapping Rule.

#### 4.7.5.2.4 Configuring R6 Profile Parameters

To configure mapping rules to R6 Profile parameters, run the following command:

**npu(config-bs-66053-srvcmaprule-1)# r6prof** [datadeliverytype {uGS | rTVR | nRTVR | bE | eRTVR | any} ] [priority <(-1 to -1 StepSize 1) | (0 to 7 StepSize 1)> ] [mediaflowtype <string (32)> ] [use-mediaflowtype {TRUE | FALSE} ] [mir <(-1 to -1 StepSize 1) | (0 to 20000 StepSize 1)> ] [cir <(-1 to -1 StepSize 1) | (0 to 20000 StepSize 1)> ] [latency <(-1 to -1 StepSize 1) | (0 to 5000 StepSize 1)>].

**IMPORTANT**

When creating a new Service Mapping Rule, at least one of the R6 Profile parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-srvcmaprule-2)# r6prof [datadeliverytype {uGS | rTVR | nRTVR | bE | eRTVR | any} ] [priority <(-1 to -1 StepSize 1) | (0 to 7 StepSize 1)> ] [mediaflowtype <string (32)> ] [use-mediaflowtype {TRUE | FALSE} ] [mir <(-1 to -1 StepSize 1) | (0 to 20000 StepSize 1)> ] [cir <(-1 to -1 StepSize 1) | (0 to 20000 StepSize 1)> ] [latency <(-1 to -1 StepSize 1) | (0 to 5000 StepSize 1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| [datadeliverytype {uGS \| rTVR \| nRTVR \| bE \| eRTVR \| any} ] | An R6 parameter entry in the lookup table specifying the data delivery type (service type).<br>(RTVR and NRTVR are not applicable for current release) | Optional | any | ■ uGS<br>■ rTVR<br>■ nRTVR<br>■ bE<br>■ eRTVR<br>■ any |
| [priority <(-1 to -1 StepSize 1) \| (0 to 7 StepSize 1)> ] | An R6 parameter entry in the lookup table specifying the traffic priority. A value of -1 means any. | Optional | -1 | ■ -1<br>■ 0 - 7 |
| [mediaflowtype <string (32)> ] | An R6 parameter entry in the lookup table that is relevant only if the use-mediaflowtype parameter is defined as TRUE | Optional | blank string | A string of 32 printable characters. |
| [use-mediaflowtype {TRUE \| FALSE} ] | If this parameter has a value TRUE, the service lookup function will try to match the R6 media flow type with the mediaFlowType entry in the table.<br>If FALSE the service lookup function will ignore the R6 media flow type. | Optional | FALSE | ■ TRUE<br>■ FALSE |
| [mir <(-1 to -1 StepSize 1) \| (0 to 20000 StepSize 1)> ] | An R6 parameter entry in the lookup table specifyingthe maximum sustained traffic rate in Kbps. A value of -1 means any. | Optional | -1 | ■ -1<br>■ 0 - 20000 |
| [cir <(-1 to -1 StepSize 1) \| (0 to 20000 StepSize 1)> ] | An R6 parameter entry in the lookup table specifying the minimum reserved traffic rate in Kbps. A value of -1 means any. | Optional | -1 | ■ -1<br>■ 0 - 20000 |
| [latency <(-1 to -1 StepSize 1) \| (0 to 5000 StepSize 1)> ] | An R6 parameter entry in the lookup table specifying tolerated latency in milliseconds. A value of -1 means any. | Optional | -1 | ■ -1<br>■ 0 - 5000 |

| Command Modes | bs service mapping rule configuration mode |
|---|---|

### 4.7.5.3 Restoring Default Values for Service Mapping Rule Configuration Parameters

After enabling the Service Mapping Rule configuration mode you can restore the default values for non-mandatory parameters in the following parameters tables:

- R1 Profile (refer to Section 4.7.5.3.1)
- R6 Profile (refer to Section 4.7.5.3.2)

#### 4.7.5.3.1 Restoring the Default Values of RI Profile Parameters

To restore some or all of R1 Profile non-mandatory parameters to their default values, run the following command:

```
npu(config-bs-66053-srvcmaprule-1)# no r1prof [modify-serviceqos ]
[dfltpriority ]
```

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the dfltpriority to the default value, run the following command:

```
npu(config-bs-66053-srvcmaprule-1)# no r1prof dfltpriority
```

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all R1 Profile non-mandatory parameters to their default value, run the following command:

```
npu(config-bs-66053-srvcmaprule-1)# no r1prof
```

**NOTE**

Refer to Section 4.7.5.2.3 for a description and default values of these parameters.

| Command Syntax | `npu(config-bs-66053-srvcmaprule-1)# no r1prof [modify-serviceqos ] [dfltpriority ]` |
|---|---|

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | bs service mapping rule configuration mode |

### 4.7.5.3.2 Restoring the Default Values of R6 Profile Parameters

To restore some or all of R6 Profile parameters to their default values, run the following command:

```
npu(config-bs-66053-srvcmaprule-1)# no r6prof [datadeliverytype ]
[priority ] [mediaflowtype ] [use-mediaflowtype] [mir ] [cir ]
[latency ]
```

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the mir and cir to the default values, run the following command:

```
npu(config-bs-66053-srvcmaprule-1)# no r6prof mir cir
```

These parameter will be restored to their default values, while all other parameters will remain unchanged.

To restore all R6 Profile parameters to their default value, run the following command:

```
npu(config-bs-66053-srvcmaprule-1)# no r6prof
```

**NOTE**

Refer to Section 4.7.5.2.4 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-bs-66053-srvcmaprule-1)# no r6prof [datadeliverytype ] [priority ] [mediaflowtype ] [use-mediaflowtype] [mir ] [cir ] [latency ]` |

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | bs service mapping rule configuration mode |

### 4.7.5.4 Terminating the Service Mapping Rule Configuration Mode

Run the following command to terminate the Service Mapping Rule configuration mode:

**npu(config-bs-66053-srvcmaprule-1)# exit**

**IMPORTANT**

Do not forget to execute the apply command before terminating the BS Service Mapping Rule configuration mode:

**npu(config-bs-66053-srvcmaprule-1)# apply**

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-servmaprule-1)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | bs service mapping rule configuration mode |

### 4.7.5.5 Deleting a Service Mapping Rule

Run the following command from the BS configuration mode to delete a Service Mapping Rule:

**npu(config-bs 66053)# no srvcmaprule** <(1 to 255 StepSize 1)>

| | |
|---|---|
| **Command Syntax** | **npu(config-bs 66053)# no srvcmaprule** <(1 to 255 StepSize 1)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `<(1 to 255 StepSize 1)>` | The Service Mapping Rule index | Mandatory | N/A | 1-255 |

**Command Modes**

bs configuration mode

## 4.7.5.6 Displaying Configuration Information for Service Mapping Rules

You can display the current configuration information for the following parameters tables:

- General (refer to Section 4.7.5.6.1)
- Order (refer to Section 4.7.5.6.2)
- R1 Profile (refer to Section 4.7.5.6.3)
- R6 Profile (refer to Section 4.7.5.6.4)
- All (refer to Section 4.7.5.6.5)

### 4.7.5.6.1 Displaying Configuration Information for General Service Mapping Rule Parameters

To display configuration for the general parameters of a specific or all Service Mapping Rules , run the following command:

**npu# show srvcmaprule-general bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ]

Specify the BS ID and Service Mapping Rule index if you want to display configuration for a particular Service Mapping Rule. For example, to display the General parameters of Service Mapping Rule 1 in BS 66053, run the following command:

**npu# show srvcmaprule-general bs 66053 rule-index 1**

Do not specify these parameters if you want to view configuration information for all existing Service Mapping Rules. To display information for all Service Mapping Rules, run the following command:

### npu# show srvcmaprule-general bs

**Command Syntax**

**npu# show srvcmaprule-general bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the general parameters of a specific Service Mapping Rule. Do not specify a value for this parameter if you want to display the general parameters of all Service Mapping Rules. | Optional | N/A | 1-16777215 |
| rule-index <(1 to 255 StepSize 1)> ] | The Service Mapping Rule index. To be used only if you want to display the general parameters of a specific Service Mapping Rule. | Optional | N/A | 1-255 |

**Display Format**

(for each existing Service Mapping Rule if requested for all Service Mapping Rules)

```
BSIDLSB                    :<value>
MappingRuleIndex           :<value>
ServiceName                :<value>
```

| | |
|---|---|
| **Command Modes** | Global command mode |

### 4.7.5.6.2 Displaying Configuration Information for Service Mapping Rule Order Parameters

To display configuration for the order parameters of a specific or all Service Mapping Rules , run the following command:

**npu# show srvcmaprule-order bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ]

Specify the BS ID and Service Mapping Rule index if you want to display configuration for a particular Service Mapping Rule. For example, to display the order parameters of Service Mapping Rule 1 in BS 66053, run the following command:

**npu# show srvcmaprule-order bs 66053 rule-index 1**

Do not specify these parameters if you want to view configuration information for all existing Service Mapping Rules. To display information for all Service Mapping Rules, run the following command:

**npu# show srvcmaprule-order bs**

| | |
|---|---|
| **Command Syntax** | **npu# show srvcmaprule-order bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the order parameters of a specific Service Mapping Rule. Do not specify a value for this parameter if you want to display the order parameters of all Service Mapping Rules. | Optional | N/A | 1-16777215 |

| | | | | | |
|---|---|---|---|---|---|
| | rule-index <(1 to 255 StepSize 1)>] | The Service Mapping Rule index. To be used only if you want to display the order parameters of a specific Service Mapping Rule. | Optional | N/A | 1-255 |

**Display Format**

(for each existing Service Mapping Rule if requested for all Service Mapping Rules)

```
BSIDLSB                                    :<value>
MappingRuleIndex                           :<value>
LookUpOrder                                :<value>
```

**Command Modes**

Global command mode

### 4.7.5.6.3 Displaying Configuration Information for Service Mapping Rule R1 Profile Parameters

To display configuration for the R1 Profile parameters of a specific or all Service Mapping Rules , run the following command:

**npu# show srvcmaprule-r1prof bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ]

Specify the BS ID and Service Mapping Rule index if you want to display configuration for a particular Service Mapping Rule. For example, to display the R1 Profile parameters of Service Mapping Rule 1 in BS 66053, run the following command:

**npu# show srvcmaprule-r1prof bs 66053 rule-index 1**

Do not specify these parameters if you want to view configuration information for all existing Service Mapping Rules. To display information for all Service Mapping Rules, run the following command:

**npu# show srvcmaprule-r1prof bs**

**Command Syntax**

**npu# show srvcmaprule-r1prof bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the R1 Profile parameters of a specific Service Mapping Rule. Do not specify a value for this parameter if you want to display the R1 Profile parameters of all Service Mapping Rules. | Optional | N/A | 1-16777215 |
| rule-index <(1 to 255 StepSize 1)>] | The Service Mapping Rule index. To be used only if you want to display the R1 Profile parameters of a specific Service Mapping Rule. | Optional | N/A | 1-255 |

| | | |
|---|---|---|
| **Display Format** (for each existing Service Mapping Rule if requested for all Service Mapping Rules) | `BSIDLSB` | `:<value>` |
| | `MappingRuleIndex` | `:<value>` |
| | `ModifyServiceQoSParameters` | `:<value>` |
| | `DefaultPriority` | `:<value>` |
| | `DataDeliveryTypeR1Profile` | `:<value>` |
| | `PriorityR1Profile` | `:<value>` |
| | `MIRR1Profile` | `:<value>` |
| | `CIRR1Profile` | `:<value>` |
| | `Jitter` | `:<value>` |
| | `LatencyR1Profile` | `:<value>` |
| | `SDULength` | `:<value>` |
| | `SDUSize` | `:<value>` |

| | |
|---|---|
| **Command Modes** | Global command mode |

### 4.7.5.6.4 Displaying Configuration Information for Service Mapping Rule R6 Profile Parameters

To display configuration for the R6 Profile parameters of a specific or all Service Mapping Rules , run the following command:

**npu# show srvcmaprule-r6prof bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ]

Specify the BS ID and Service Mapping Rule index if you want to display configuration for a particular Service Mapping Rule. For example, to display the R6 Profile parameters of Service Mapping Rule 1 in BS 66053, run the following command:

**npu# show srvcmaprule-r6prof bs 66053 rule-index 1**

Do not specify these parameters if you want to view configuration information for all existing Service Mapping Rules. To display information for all Service Mapping Rules, run the following command:

**npu# show srvcmaprule-r6prof bs**

| | |
|---|---|
| **Command Syntax** | **npu# show srvcmaprule-r6prof bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ] |

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the R6 Profile parameters of a specific Service Mapping Rule. Do not specify a value for this parameter if you want to display the general parameters of all Service Mapping Rules. | Optional | N/A | 1-16777215 |
| rule-index <(1 to 255 StepSize 1)>] | The Service Mapping Rule index. To be used only if you want to display the R6 Profile parameters of a specific Service Mapping Rule. | Optional | N/A | 1-255 |

**Display Format**

(for each existing Service Mapping Rule if requested for all Service Mapping Rules)

```
BSIDLSB                          :<value>
MappingRuleIndex                 :<value>
DataDeliveryTypeR6Profile        :<value>
PriorityR6Profile                :<value>
MediaFlowType                    :<value>
UseMediaFlowType                 :<value>
CIRR6Profile                     :<value>
MIRR6Profile                     :<value>
LatencyR6Profile                 :<value>
```

**Command Modes**

Global command mode

### 4.7.5.6.5 Displaying Configuration Information for All Service Mapping Profile Parameters

To display all configuration parameters of a specific or all Service Mapping Rules , run the following command:

**npu# show srvcmaprule-all bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)> ]

Specify the BS ID and Service Mapping Rule index if you want to display configuration for a particular Service Mapping Rule. For example, to display all parameters of Service Mapping Rule 1 in BS 66053, run the following command:

**npu# show srvcmaprule-all bs 66053 rule-index 1**

Do not specify these parameters if you want to view configuration information for all existing Service Mapping Rules. To display information for all Service Mapping Rules, run the following command:

**npu# show srvcmaprule-all bs**

**Command Syntax**

**npu# show srvcmaprule-all bs** [<(1 to 16777215 StepSize 1)> rule-index <(1 to 255 StepSize 1)>]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display all parameters of a specific Service Mapping Rule. Do not specify a value for this parameter if you want to display all parameters of all Service Mapping Rules. | Optional | N/A | 1-16777215 |
| rule-index <(1 to 255 StepSize 1)>] | The Service Mapping Rule index. To be used only if you want to display all parameters of a specific Service Mapping Rule. | Optional | N/A | 1-255 |

| Command Modes | Global command mode |
|---|---|

## 4.7.6 Managing Power Control Levels and Policies

**To configure a the Power Control Levels and Policies:**

1. Enable the Power Control configuration mode (refer to Section 4.7.6.1)
2. You can now execute any of the following tasks:
   - Configure one or more of the Power Control parameters tables (refer to Section 4.7.6.2)
   - Restore the default values of parameters in one or more of the Power Control parameters tables (refer to Section 4.7.6.3)
   - Terminate the Power Control configuration mode (refer to Section 4.7.6.4)

In addition, you can, at any time, display configuration information for each of the parameters tables (refer to Section 4.7.6.5).

### 4.7.6.1 Enabling the Power Control Configuration Mode

To configure the Power Control parameters, first enable the Power Control configuration mode. Run the following command to enable the Power Control configuration mode.

Note that for properly completing the configuration the **apply** command must be executed prior to exiting the Power Control configuration mode.

```
npu(config-bs-66053)# pwrctrl
```

The Power Control configuration mode is enabled, after which you can execute any of the following tasks:

- Configure one or more of the Power Control parameters tables (refer to Section 4.7.6.2)
- Restore the default values of parameters in one or more of the parameters tables (refer to Section 4.7.6.3)

After executing the above tasks, you can terminate the Power Control configuration mode (refer to Section 4.7.6.4) and return to the BS configuration mode.

Note that for properly completing the Power Control configuration the **apply** command must be executed prior to exiting the Power Control configuration mode.

| | |
|---|---|
| **Command Syntax** | **`npu(config-bs-66053)# pwrctrl`** |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.6.2 Configuring Power Control Parameters

After enabling the Power Control configuration mode you can configure the following parameters tables:

- Target Noise and Interference Level (refer to Section 4.7.6.2.1)
- Maximum EIRP (refer to Section 4.7.6.2.2)
- Required C/N Level (refer to Section 4.7.6.2.3)
- Open Loop Correction Policy (refer to Section 4.7.6.2.4)
- Open Loop Correction Range (refer to Section 4.7.6.2.5)
- Closed Loop - Unstable MS (refer to Section 4.7.6.2.6)
- Closed Loop - MS in Network Entry (refer to Section 4.7.6.2.7)
- Closed Loop Correction Range (refer to Section 4.7.6.2.8)

**IMPORTANT**

After completing the Power Control configuration,do not forget to execute the apply command before exiting the Power Control configuration mode:
**npu(config-bs-66053-pwrctrl)# apply**

#### 4.7.6.2.1 Configuring Power Control Target Noise and Interference Level Parameters

The Target Noise and Interference Level table enables defining the target limits for various noise and interference levels.

To configure the Target Noise and Interference Levels, run the following command:

**npu(config-bs-66053-pwrctrl)# nilevels** [cqi-ack-ranging <(-150 to -22.5 StepSize 0.5)> ] [pusc <(-150 to -22.5 StepSize 0.5)> ]

**IMPORTANT**

When creating a new BS, at least one of the Power Control Target Noise and Interference Level parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-pwrctrl)# nilevels [cqi-ack-ranging <(-150 to -22.5 StepSize 0.5)> ] [pusc <(-150 to -22.5 StepSize 0.5)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [cqi-ack-ranging <(-150 to -22.5 StepSize 0.5)> ]> | Target Noise and interference level for the (CQI), ACK and periodic ranging regions, in dBm. | Optional | -128 | -150 to -22.5 in steps of 0.5 |
| [pusc <(-150 to -22.5 StepSize 0.5)> ] | Target Noise and interference level for the PUSC zone, in dBm | Optional | -128 | -150 to -22.5 in steps of 0.5 |

**Command Modes**

bs power control configuration mode

### 4.7.6.2.2 Configuring the Power Control Maximum EIRP

The maxeirxp parameter enables defining the maximum effective isotropic received power at the BS for Initial ranging.

To configure the maxeirxp, run the following command:

**npu(config-bs-66053-pwrctrl)# maxeirxp** <(-140 to -40 StepSize 1)>

**IMPORTANT**

When creating a new BS, the maxeirxp parameters must be configured explicitly (even if configured to the default value).

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# maxeirxp** <(-140 to -40 StepSize 1)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| maxeirxp <(-140 to -40 StepSize 1)> | The maximum effective isotropic received power at the BS for Initial ranging, in dBm. | Optional | -124 | -140 to -40 |

**Command Modes** bs power control configuration mode

### 4.7.6.2.3 Configuring the Power Control Required C/N Level Parameters

The Required C/N Levels table enables defining the Carrier to Noise Ratios required for various types of transmissions.

To configure the Required C/N Levels, run the following command:

**npu(config-bs-66053-pwrctrl)# requiredcnr** [ack <(-20 to 50 StepSize 1)> ] [cqi <(-20 to 50 StepSize 1)> ] [cdma <(-20 to 50 StepSize 1)> ] [qpsk-1by2 <(-20 to 50 StepSize 1)> ] [qpsk-3by4 <(-20 to 50 StepSize 1)> ] [qam16-1by2 <(-20 to 50 StepSize 1)> ] [qam16-3by4 <(-20 to 50 StepSize 1)> ] [qam64-1by2 <(-20 to 50 StepSize 1)> ] [qam64-2by3 <(-20 to 50 StepSize 1)> ] [qam64-3by4 <(-20 to 50 StepSize 1)> ] [qam64-5by6 <(-20 to 50 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Power Control Required C/N Level parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-pwrctrl)# requiredcnr [ack <(-20 to 50 StepSize 1)> ] [cqi <(-20 to 50 StepSize 1)> ] [cdma <(-20 to 50 StepSize 1)> ] [qpsk-1by2 <(-20 to 50 StepSize 1)> ] [qpsk-3by4 <(-20 to 50 StepSize 1)> ] [qam16-1by2 <(-20 to 50 StepSize 1)> ] [qam16-3by4 <(-20 to 50 StepSize 1)> ] [qam64-1by2 <(-20 to 50 StepSize 1)> ] [qam64-2by3 <(-20 to 50 StepSize 1)> ] [qam64-3by4 <(-20 to 50 StepSize 1)> ] [qam64-5by6 <(-20 to 50 StepSize 1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [ack <(-20 to 50 StepSize 1)> ] | The C/N in dB required for sending ACK, reported to the MS for power control purposes. | Optional | 7 | -20 to 50 |
| [cqi <(-20 to 50 StepSize 1)> ] | The C/N in dB required for sending CQI, reported to the MS for power control purposes.<br>Must be in the range from requiredcnr-ack - 8 to requiredcnr-ack + 7 (see ack parameter above) | Optional | 0 | -20 to 50 |
| [cdma <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting CDMA, reported to the MS for power control purposes.<br>Must be in the range from requiredcnr-cqi - 8 to requiredcnr-cqi + 7 (see cqi parameter above) | Optional | 0 | -20 to 50 |

| | | | | | |
|---|---|---|---|---|---|
| [qpsk-1by2 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using QPSK 1/2, reported to the MS for power control purposes.<br><br>Must be in the range from requiredcnr-cdma - 16 to requiredcnr-cdma + 14 (see cdma parameter above) | Optional | 14 | -20 to 50 |
| [qpsk-3by4<(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using QPSK 3/4, reported to the MS for power control purposes.<br><br>Must be in the range from requiredcnr-qpsk-1by2 - 16 to requiredcnr-qpsk-1by2 + 14 (see qpsk-1by2 parameter above) | Optional | 16 | -20 to 50 |
| [qam16-1by2 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 16QAM 1/2, reported to the MS for power control purposes.<br><br>Must be in the range from requiredcnr-qpsk-3by4 - 8 to requiredcnr-qpsk-3by4 + 7 (see qpsk-3by4 parameter above) | Optional | 18 | -20 to 50 |
| [qam16-3by4 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 16QAM 3/4, reported to the MS for power control purposes.<br><br>Must be in the range from requiredcnr-qam16-1by2 - 16 to requiredcnr-qam16-1by2 + 14 (see qam16-1by2 parameter above) | Optional | 22 | -20 to 50 |
| qam64-1by2 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 64QAM 1/2, reported to the MS for power control purposes.<br><br>Must be in the range from requiredcnr-qam16-3by4 - 16 to requiredcnr-qam16-3by4 + 14 (see qam16-3by4 parameter above) | Optional | 23 | -20 to 50 |

| | | | | | |
|---|---|---|---|---|---|
| | [qam64-2by3 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 64QAM 2/3, reported to the MS for power control purposes.<br>Must be in the range from requiredcnr-qam64-1by2 - 8 to requiredcnr-qam64-1by2 + 7 (see qam64-1by2 parameter above) | Optional | 23 | -20 to 50 |
| | [qam64-3by4 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 64QAM 3/4, reported to the MS for power control purposes.<br>Must be in the range from requiredcnr-qam64-2by3 - 8 to requiredcnr-qam54-2by3 + 7 (see qam54-2by3 parameter above) | Optional | 23 | -20 to 50 |
| | [qam64-5by6 <(-20 to 50 StepSize 1)> ] | he C/N in dB required for transmitting using 64QAM 5/6, reported to the MS for power control purposes.<br>Must be in the range from requiredcnr-qam64-3by4 - 8 to requiredcnr-qam64-3by4 + 7 (see qam64-3by4 parameter above) | Optional | 23 | -20 to 50 |

**Command Modes** bs power control configuration mode

### 4.7.6.2.4 Configuring the Power Control Open Loop Correction Policy Parameters

To configure the Open Loop Correction Policy parameters, run the following command:

**npu(config-bs-66053-pwrctrl)# olpolicy** [positivecoefficient <(0 to 1 StepSize 0.05)> ] [negativecoefficient<(0 to 1 StepSize 0.05)> ] [max-positivecorrection <(0 to 20 StepSize 0.1)> ] [max-negativecorrection <(0 to 20 StepSize 0.1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Power Control Open Loop Correction Policy parameters must be configured explicitly (even if configured to the default value).

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# olpolicy** [positivecoefficient <(0 to 1 StepSize 0.05)> ] [negativecoefficient<(0 to 1 StepSize 0.05)> ] [max-positivecorrection <(0 to 20 StepSize 0.1)> ] [max-negativecorrection <(0 to 20 StepSize 0.1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [positivecoefficient <(0 to 1 StepSize 0.05)> ] | Correction coefficient for open loop when giving positive corrections | Optional | 0.7 | 0 to 1 in steps of 0.5 |
| [negativecoefficient <(0 to 1 StepSize 0.05)> ] | Correction coefficient for open loop when giving negative corrections | Optional | 0.7 | 0 to 1 in steps of 0.5 |
| [max-positivecorrection <(0 to 20 StepSize 0.1)> ] | Maximum positive power correction (in dB) for open loop | Optional | 8 | 0 to 20 in steps of 0.1 |
| [max-negativecorrection <(0 to 20 StepSize 0.1)> ] | Maximum negative power correction (in dB) for open loop | Optional | 8 | 0 to 20 in steps of 0.1 |

| | |
|---|---|
| **Command Modes** | bs power control configuration mode |

### 4.7.6.2.5 Configuring the Power Control Open Loop Correction Range Parameters

To configure the Open Loop Correction Range parameters, run the following command:

**npu(config-bs-66053-pwrctrl)# olrange** [lowthrshld-linear <(-20 to 0 StepSize 0.1)> ] [lowthrshld-constant <(-20 to 0 StepSize 0.1)> ] [highthrshld-linear <(0 to 20 StepSize 0.1)> ] [highthrshld-constant <(0 to 20 StepSize 0.1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Power Control Open Loop Correction Range parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-pwrctrl)# olrange [lowthrshld-linear <(-20 to
0 StepSize 0.1)> ] [lowthrshld-constant <(-20 to 0 StepSize 0.1)>
] [highthrshld-linear <(0 to 20 StepSize 0.1)> ]
[highthrshld-constant <(0 to 20 StepSize 0.1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [lowthrshld-linear <(-20 to 0 StepSize 0.1)> ] | The open loop correction range threshold (in dB) below which linear corrections are made.<br>Cannot be lower than olrange-lowthrshld-constant (see below) | Optional | -18 | -20 to 0 in steps of 0.1 |
| [lowthrshld-constant <(-20 to 0 StepSize 0.1)> ] | The open loop correction range threshold (in dB) below which constant corrections are made. | Optional | -19 | -20 to 0 in steps of 0.1 |
| [highthrshld-linear <(0 to 20 StepSize 0.1)> ] | The open loop correction range threshold (in dB) above which linear corrections are made. | Optional | 18 | 0 to 20 in steps of 0.1 |
| [highthrshld-constant <(0 to 20 StepSize 0.1)> ] | The open loop correction range threshold (in dB) above which constant corrections are made.<br>Cannot be lower than olrange-highthrshld-linear (see above) | Optional | 19 | 0 to 20 in steps of 0.1 |

**Command Modes**

bs power control configuration mode

### 4.7.6.2.6 Configuring the Power Control Closed Loop - Unstable MS Parameters

To configure the Closed Loop - Unstable MS parameters, run the following command:

**npu(config-bs-66053-pwrctrl)# clunstable** [positivecoefficient <(0 to 1 StepSize 0.05)> ] [negativecoefficient <(0 to 1 StepSize 0.05)> ] [max-positivecorrection <(0 to 20 StepSize 0.1)> ][max-negativecorrection <(0 to 20 StepSize 0.1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Power Control Closed Loop - Unstable MS parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-pwrctrl)# clunstable [positivecoefficient <(0 to 1 StepSize 0.05)> ] [negativecoefficient <(0 to 1 StepSize 0.05)> ] [max-positivecorrection <(0 to 20 StepSize 0.1)> ][max-negativecorrection <(0 to 20 StepSize 0.1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [positivecoefficient <(0 to 1 StepSize 0.05)> ] | Correction coefficient for problematic MS in a closed loop when giving positive corrections | Optional | 0.8 | 0 to 1 in steps of 0.05 |
| [negativecoefficient <(0 to 1 StepSize 0.05)> ] | Correction coefficient for problematic MS in a closed loop when giving negative corrections | Optional | 0.7 | 0 to 1 in steps of 0.05 |
| [max-positivecorrection <(0 to 20 StepSize 0.1)> ] | Maximum positive power correction (in dB) for problematic MS in a closed loop | Optional | 3 | 0 to 20 in steps of 0.1 |
| [max-negativecorrection <(0 to 20 StepSize 0.1)> ] | Maximum negative power correction (in dB) for problematic MS in a closed loop | Optional | 8 | 0 to 20 in steps of 0.1 |

**Command Modes**

bs power control configuration mode

### 4.7.6.2.7 Configuring the Power Control Closed Loop - MS in Network Entry Parameters

To configure the Closed Loop - MS in Network Entry parameters, run the following command:

**npu(config-bs-66053-pwrctrl)# clne** [positivecoefficient <(0 to 1 StepSize 0.05)> ] [negativecoefficient <(0 to 1 StepSize 0.05)> ] [max-positivecorrection <(0 to 20 StepSize 0.1)> ] [max-negativecorrection <(0 to 20 StepSize 0.1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Power Control Closed Loop - MS in Network Entry parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-pwrctrl)# clne [positivecoefficient <(0 to 1
StepSize 0.05)> ] [negativecoefficient <(0 to 1 StepSize 0.05)> ]
[max-positivecorrection <(0 to 20 StepSize 0.1)> ]
[max-negativecorrection <(0 to 20 StepSize 0.1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [positivecoefficient <(0 to 1 StepSize 0.05)> ] | Correction coefficient for network entry in closed loop when giving positive corrections | Optional | 0.7 | 0 to 1 dB in steps of 0.05 |
| [negativecoefficient <(0 to 1 StepSize 0.05)> ] | Correction coefficient for network entry in closed loop when giving negative corrections | Optional | 0.7 | 0 to 1 dB in steps of 0.05 |
| [max-positivecorrection <(0 to 20 StepSize 0.1)> ] | Maximum positive power correction (in dB) for network entry in closed loop | Optional | 8 | 0 to 20 in steps of 0.1 |
| [max-negativecorrection <(0 to 20 StepSize 0.1)> ] | Maximum negative power correction (in dB) for network entry in closed loop | Optional | 8 | 0 to 20 in steps of 0.1 |

**Command Modes** bs power control configuration mode

### 4.7.6.2.8 Configuring the Power Control Closed Loop Correction Range Parameters

To configure the Closed Loop Correction Range parameters, run the following command:

**npu(config-bs-66053-pwrctrl)# clrange** [lowthrshld-linear <(-20 to 0 StepSize 0.1)> ] [lowthrshld-constant <(-20 to 0 StepSize 0.1)> ] [highthrshld-linear <(0 to 20 StepSize 0.1)> ] [highthrshld-constant <(0 to 20 StepSize 0.1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Power Control Closed Loop Correction Range parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-pwrctrl)# clrange [lowthrshld-linear <(-20 to
0 StepSize 0.1)> ] [lowthrshld-constant <(-20 to 0 StepSize 0.1)>
] [highthrshld-linear <(0 to 20 StepSize 0.1)> ]
[highthrshld-constant <(0 to 20 StepSize 0.1)> ]
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [lowthrshld-linear <(-20 to 0 StepSize 0.1)> ] | Closed loop correction range threshold (in dB) below which linear corrections are made.<br>Cannot be lower than clrange-lowthrshld-constant (see below) | Optional | -2 | -20 to 0 in steps of 0.1 |
| lowthrshld-constant <(-20 to 0 StepSize 0.1)> ] | Closed loop correction range threshold (in dB) below which constant corrections are made. | Optional | -8 | -20 to 0 in steps of 0.1 |

| | | | | | |
|---|---|---|---|---|---|
| | [highthrshld-linear <(0 to 20 StepSize 0.1)> ] | Closed loop correction range threshold (in dB) above which linear corrections are made. | Optional | 2 | -20 to 0 in steps of 0.1 |
| | [highthrshld-constant <(0 to 20 StepSize 0.1)> ] | Closed loop correction range threshold (in dB) above which constant corrections are made.<br>Cannot be lower than clrange-highthrshld-linear (see above) | Optional | 8 | -20 to 0 in steps of 0.1 |

**Command Modes** bs power control configuration mode

### 4.7.6.3 Restoring Default Values for Power Control Configuration Parameters

After enabling the Power Control configuration mode you can restore the default values for parameters in the following parameters tables:

- Noise and Interference Level (refer to Section 4.7.6.3.1)
- Maximum EIRP (refer to Section 4.7.6.3.2)
- Required C/N Level (refer to Section 4.7.6.3.3)
- Open Loop Correction Policy (refer to Section 4.7.6.3.4)
- Open Loop Correction Range (refer to Section 4.7.6.3.5)
- Closed Loop - Unstable MS (refer to Section 4.7.6.3.6)
- Closed Loop - MS in Network Entry (refer to Section 4.7.6.3.7)
- Closed Loop Correction Range (refer to Section 4.7.6.3.8)

#### 4.7.6.3.1 Restoring the Default Values of Power Control Target Noise and Interference Level Parameters

To restore one or all of the Target Noise and Interference Level parameters to their default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no nilevels** [cqi-ack-ranging ] [pusc]

You can restore only one parameter to its default values by specifying only that parameter. For example, to restore only the pusc to the default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no nilevels pusc**

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Target Noise and Interference Level parameters to their default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no nilevels**

**NOTE**

Refer to Section 4.7.6.2.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# no nilevels** [cqi-ack-ranging ] [pusc] |
| **Privilege Level** | 10 |
| **Command Modes** | bs power control configuration mode |

### 4.7.6.3.2 Restoring the Default Values of the Power Control Maximum EIRP Parameter

To restore the maxeirxp parameter to its default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no maxeirxp**

**NOTE**

Refer to Section 4.7.6.2.2 for a description and default value of this parameter.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# no maxeirxp** |

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | bs power control configuration mode |

### 4.7.6.3.3 Restoring the Default Values of Power Control Required C/N Level Parameters

To restore some or all of the Required C/N Levels parameters to their default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no requiredcnr** [ack ] [cqi ] [cdma ] [qpsk-1by2 ] [qpsk-3by4 ] [qam16-1by2 ] [qam16-3by4 ] [qam64-1by2 ] [qam64-2by3 ] [qam64-3by4 ] [qam64-5by6 ]

You can restore only some parameters to their default values by specifying only those parameter. For example, to restore only the ack and cqi parameters to the default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no requiredcnr ack cqi**

These parameters will be restored to their default value, while the other parameters will remain unchanged.

To restore all Required C/N Levels parameters to their default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no requiredcnr**

**NOTE**

Refer to Section 4.7.6.2.3 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# no requiredcnr** [ack ] [cqi ] [cdma ] [qpsk-1by2 ] [qpsk-3by4 ] [qam16-1by2 ] [qam16-3by4 ] [qam64-1by2 ] [qam64-2by3 ] [qam64-3by4 ] [qam64-5by6 ] |

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | bs power control configuration mode |

#### 4.7.6.3.4 Restoring the Default Values of Power Control Open Loop Correction Policy Parameters

To restore some or all of the Open Loop Correction Policy parameters to their default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no olpolicy** [positivecoefficient ] [negativecoefficient ] [max-positivecorrection ] [max-negativecorrection ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the positivecoefficient and negativecoefficient parameters to the default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no olpolicy positivecoefficient negativecoefficient**

These parameters will be restored to their default value, while the other parameters will remain unchanged.

To restore all Open Loop Correction Policy parameters to their default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no olpolicy**

**NOTE**

Refer to Section 4.7.6.2.4 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# no olpolicy** [positivecoefficient ] [negativecoefficient ] [max-positivecorrection ] [max-negativecorrection ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs power control configuration mode |

### 4.7.6.3.5 Restoring the Default Values of Power Control Open Loop Correction Range Parameters

To restore some or all of the Open Loop Correction Range parameters to their default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no olrange** [lowthrshld-linear ] [lowthrshld-constant ] [highthrshld-linear ] [highthrshld-constant ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the highthrshld-linear and highthrshld-constant parameters to the default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no olrange highthrshld-linear highthrshld-constant**

These parameters will be restored to their default value, while the other parameters will remain unchanged.

To restore all Open Loop Correction Range parameters to their default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no olrange**

**NOTE**

Refer to Section 4.7.6.2.5 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-bs-66053-pwrctrl)# no olrange [lowthrshld-linear ] [lowthrshld-constant ] [highthrshld-linear ] [highthrshld-constant ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs power control configuration mode |

### 4.7.6.3.6 Restoring the Default Values of Power Control Closed Loop - Unstable MS Parameters

To restore some or all of the Open Loop - Unstable MS parameters to their default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no clunstable** [positivecoefficient ] [negativecoefficient ] [max-positivecorrection ] [max-negativecorrection ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the positivecoefficient and negativecoefficient parameters to the default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no clunstable positivecoefficient negativecoefficient**

These parameters will be restored to their default value, while the other parameters will remain unchanged.

To restore all Open Loop - Unstable MS parameters to their default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no clunstable**

**NOTE**

Refer to Section 4.7.6.2.6 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# no** clunstable [positivecoefficient ] [negativecoefficient ] [max-positivecorrection ] [max-negativecorrection ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs power control configuration mode |

### 4.7.6.3.7 Restoring the Default Values of Power Control Closed Loop - MS in Network Entry Parameters

To restore some or all of the Open Loop - MS in Network Entry parameters to their default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no clne** [positivecoefficient ] [negativecoefficient ] [max-positivecorrection ] [max-negativecorrection ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the positivecoefficient and negativecoefficient parameters to the default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no clne positivecoefficient negativecoefficient**

These parameters will be restored to their default value, while the other parameters will remain unchanged.

To restore all Open Loop - MS in Network Entry parameters to their default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no clne**

**NOTE**

Refer to Section 4.7.6.2.7 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# no** clne [positivecoefficient ] [negativecoefficient ] [max-positivecorrection ] [max-negativecorrection ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs power control configuration mode |

### 4.7.6.3.8 Restoring the Default Values of Power Control Closed Loop Correction Range Parameters

To restore some or all of the Closed Loop Correction Range parameters to their default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no clrange** [lowthrshld-linear ] [lowthrshld-constant ] [highthrshld-linear ] [highthrshld-constant ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the highthrshld-linear and highthrshld-constant parameters to the default values, run the following command:

**npu(config-bs-66053-pwrctrl)# no clrange highthrshld-linear highthrshld-constant**

These parameters will be restored to their default value, while the other parameters will remain unchanged.

To restore all Closed Loop Correction Range parameters to their default value, run the following command:

**npu(config-bs-66053-pwrctrl)# no clrange**

**NOTE**

Refer to Section 4.7.6.2.8 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-bs-66053-pwrctrl)# no clrange [lowthrshld-linear ] [lowthrshld-constant ] [highthrshld-linear ] [highthrshld-constant ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs power control configuration mode |

### 4.7.6.4 Terminating the Power Control Configuration Mode

Run the following command to terminate the Power Control configuration mode:

**npu(config-bs-66053-pwrctrl)# exit**

**IMPORTANT**

Do not forget to execute the apply command before terminating the Power Control configuration mode: **npu(config-bs-66053-pwrctrl)# apply**

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-pwrctrl)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | bs power control configuration mode |

## 4.7.6.5 Displaying Configuration Information for Power Control Parameters

You can display the current configuration information for the following parameters tables:

- Noise and Interference Level (refer to Section 4.7.6.5.1)
- Maximum EIRP (refer to Section 4.7.6.5.2)
- Required C/N Level (refer to Section 4.7.6.5.3)
- Open Loop Correction Policy (refer to Section 4.7.6.5.4)
- Open Loop Correction Range (refer to Section 4.7.6.5.5)
- Closed Loop - Unstable MS (refer to Section 4.7.6.5.6)
- Closed Loop - MS in Network Entry (refer to Section 4.7.6.5.7)
- Closed Loop Correction Range (refer to Section 4.7.6.5.8)
- All (refer to Section 4.7.6.5.9)

### 4.7.6.5.1 Displaying Configuration Information for Power Control Target Noise and Interference Level Parameters

To display configuration for the Power Control Target Noise and Interference Level parameters, run the following command:

**npu# show pwrctrl-nilevels bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Power Control Target Noise and Interference Level parameters of BS 66053, run the following command:

**npu# show pwrctrl-nilevels bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-nilevels bs**

| | |
|---|---|
| **Command Syntax** | **npu# show pwrctrl-nilevels bs** [<(1 to 16777215 StepSize 1) |

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Target Noise and Interference Level parameters of a specific BS. Do not specify a value for this parameter if you want to display the Target Noise and Interference Level parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
NoiseandInterferenceLevelforCQI&ACKRegion        :<value>
NoiseandInterferenceLevelforPUSCZone             :<value>
```

**Command Modes**

Global command mode

### 4.7.6.5.2 Displaying Configuration Information for Power Control Maximum EIRP

To display configuration for the Power Control Maximum EIRP parameter, run the following command:

**npu# show pwrctrl-maxeirxp bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Power Control Maximum EIRP parameter of BS 66053, run the following command:

**npu# show pwrctrl-maxeirxp bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-maxeirxp bs**

**Command Syntax**

**npu# show pwrctrl-maxeirxp bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Maximum EIRP parameter of a specific BS. Do not specify a value for this parameter if you want to display the Maximum EIRP parameter of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                    :<value>
MaxEIRxP                                   :<value>
```

**Command Modes**

Global command mode

### 4.7.6.5.3 Displaying Configuration Information for Power Control Required C/N Level Parameters

To display configuration for the Power Control Required C/N Level parameters, run the following command:

**npu# show pwrctrl-requiredcnr bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Power Control Required C/N Level parameters of BS 66053, run the following command:

**npu# show pwrctrl-requiredcnr bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-requiredcnr bs**

**Command Syntax**

**npu# show pwrctrl-requiredcnr bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Required C/N Level parameters of a specific BS. Do not specify a value for this parameter if you want to display the Required C/N Level parameters of all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format**<br>(for each existing BS if requested for all BSs) | BSIDLSB :<value><br>RequiredCNRforACK :<value><br>RequiredCNRforCQI :<value><br>RequiredCNRforCDMA :<value><br>RequiredCNRforQPSK1/2 :<value><br>RequiredCNRforQPSK3/4 :<value><br>RequiredCNRfor16QAM1/2 :<value><br>RequiredCNRfor16QAM3/4 :<value><br>RequiredCNRfor64QAM1/2 :<value><br>RequiredCNRfor64QAM2/3 :<value><br>RequiredCNRfor64QAM3/4 :<value><br>RequiredCNRfor64QAM5/6 :<value> |
| **Command Modes** | Global command mode |

#### 4.7.6.5.4 Displaying Configuration Information for Power Control Open Loop Correction Policy Parameters

To display configuration for the Power Control Open Loop Correction Policy parameters, run the following command:

**npu# show pwrctrl-olpolicy bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Power Control Open Loop Correction Policy parameters of BS 66053, run the following command:

**npu# show pwrctrl-olpolicy bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-olpolicy bs**

| | |
|---|---|
| **Command Syntax** | **npu# show pwrctrl-olpolicy bs** [<(1 to 16777215 StepSize 1) |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Open Loop Correction Policy parameters of a specific BS. Do not specify a value for this parameter if you want to display the Open Loop Correction Policy parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
OpenLoopPositiveCorrectionCoefficient            :<value>
OpenLoopNegativeCorrectionCoefficient            :<value>
OpenLoopMaximumPositivePowerCorrection(dB)       :<value>
OpenLoopMaximumNegativePowerCorrection(dB)       :<value>
```

**Command Modes**

Global command mode

### 4.7.6.5.5 Displaying Configuration Information for Power Control Open Loop Correction Range Parameters

To display configuration for the Power Control Open Loop Correction Range parameters, run the following command:

**npu# show pwrctrl-olrange bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Power Control Open Loop Correction Range parameters of BS 66053, run the following command:

**npu# show pwrctrl-olrange bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-olrange bs**

**Command Syntax**

**npu# show pwrctrl-olrange bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Open Loop Correction Range parameters of a specific BS. Do not specify a value for this parameter if you want to display the Open Loop Correction Range parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
OpenLoopLowerThresholdforLinearCorrection(dB)    :<value>
OpenLoopLowerThresholdforConstantCorrection(dB)  :<value>
OpenLoopHigherThresholdforLinearCorrection(dB)   :<value>
OpenLoopHigherThresholdforConstantCorrection(dB) :<value>
```

**Command Modes**

Global command mode

### 4.7.6.5.6 Displaying Configuration Information for Power Control Closed Loop - Unstable MS Parameters

To display configuration for the Power Control Closed Loop - Unstable MS parameters, run the following command:

**npu# show pwrctrl-clunstable bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Power Control Closed Loop - Unstable MS parameters of BS 66053, run the following command:

**npu# show pwrctrl-clunstable bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-clunstable bs**

**Command Syntax**

**npu# show pwrctrl-clunstable bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Closed Loop - Unstable MS parameters of a specific BS. Do not specify a value for this parameter if you want to display the Closed Loop - Unstable MS parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                                    :<value>
ClosedLoopUnstableMSPositiveCorrectionCoefficient :<value>
ClosedLoopUnstableMSNegativeCorrectionCoefficient :<value>
ClosedLoopUnstableMSMaximumPositivePowerCorrection(dB):<value>
ClosedLoopUnstableMSMaximumNegativePowerCorrection(dB):<value>
```

**Command Modes**

Global command mode

### 4.7.6.5.7 Displaying Configuration Information for Power Control Closed Loop - MS in Network Entry Parameters

To display configuration for the Power Control Closed Loop - MS in Network Entry parameters, run the following command:

**npu# show pwrctrl-clne bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Power Control Closed Loop - MS in Network Entry parameters of BS 66053, run the following command:

**npu# show pwrctrl-clne bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-clne bs**

**Command Syntax**

**npu# show pwrctrl-clne bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Closed Loop - MS in Network Entry parameters of a specific BS. Do not specify a value for this parameter if you want to display the Closed Loop - MS in Network Entry parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                                    :<value>
ClosedLoopNetworkEntryPositiveCorrectionCoefficient:<value>
ClosedLoopNetworkEntryNegativeCorrectionCoefficient:<value>
ClosedLoopNetworkEntryMaximumPositivePowerCorrection(dB):<value>
ClosedLoopNetworkEntryMaximumNegativePowerCorrection(dB):<value>
```

**Command Modes** Global command mode

### 4.7.6.5.8 Displaying Configuration Information for Power Control Closed Loop Correction Range Parameters

To display configuration for the Power Control Closed Loop Correction Range parameters, run the following command:

**npu# show pwrctrl-clrange bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Power Control Closed Loop Correction Range parameters of BS 66053, run the following command:

**npu# show pwrctrl-clrange bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-clrange bs**

**Command Syntax** **npu# show pwrctrl-clrange bs** [<(1 to 16777215 StepSize 1)

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Closed Loop Correction Range parameters of a specific BS. Do not specify a value for this parameter if you want to display the Closed Loop Correction Range parameters of all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format**<br>(for each existing BS if requested for all BSs) | `BSIDLSB :<value>`<br>`ClosedLoopLowerThresholdforLinearCorrection(dB) :<value>`<br>`ClosedLoopLowerThresholdforConstantCorrection(dB) :<value>`<br>`ClosedLoopHigherThresholdforLinearCorrection(dB) :<value>`<br>`ClosedLoopHigherThresholdforConstantCorrection(dB):<value>` |
| **Command Modes** | Global command mode |

### 4.7.6.5.9 Displaying Configuration Information for All Power Control Parameters

To display configuration for all Power Control parameters, run the following command:

**npu# show pwrctrl-all bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display all Power Control parameters of BS 66053, run the following command:

**npu# show pwrctrl-all bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show pwrctrl-all bs**

| | |
|---|---|
| **Command Syntax** | **npu# show pwrctrl-all bs** [<(1 to 16777215 StepSize 1) |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display all Power Control parameters of a specific BS. Do not specify a value for this parameter if you want to display all Power Control parameters of all BSs. | Optional | N/A | 1-16777215 |

**Command Modes**

Global command mode

## 4.7.7 Managing BS Feedback Allocation Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Feedback Allocation parameters (refer to Section 4.7.7.1).
- Restore the default values of one or all of the Feedback Allocation parameters (refer to Section 4.7.7.2).

You can display configuration information for the Feedback Allocation parameters of a selected or all existing BSs (refer to Section 4.7.7.3).

### 4.7.7.1 Configuring Feedback Allocation Parameters

**To configure the Feedback Allocation Parameters:**

From the BS configuration mode, run the following command:

```
npu(config-bs-66053)# feedbackalloc [pr-cdma <(0 to 12000 StepSize 1)> ] [ir-cdma <(0 to 12000 StepSize 1)> ] [max-cqi <(0 to 29 StepSize 1)> ] [ert-poll-enable {true | false} ]
```

**IMPORTANT**

When creating a new BS, the mandatory max-cqi parameter must be configured. Typically it should be configured to 7 for bandwidth=5MHz and 19 for bandwidth=7 or 10 MHz.

**Command Syntax**

```
npu(config-bs-66053)# feedbackalloc [pr-cdma <(0 to 12000 StepSize 1)> ] [ir-cdma <(0 to 12000 StepSize 1)> ] [max-cqi <(0 to 29 StepSize 1)> ] [ert-poll-enable {true | false} ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [pr-cdma <(0 to 12000 StepSize 1)> ] | The period of PR CDMA allocations, in frames.<br>Cannot be higher than ir-cdma (see below) | Optional | 5 | 0 - 12000 |
| [ir-cdma <(0 to 12000 StepSize 1)> ] | The period of IR CDMA allocations, in frames | Optional | 20 | 0 - 12000 |
| [max-cqi <(0 to 29 StepSize 1)> ] | The maximum size allowed for the CQI region, in subchannels. | Mandatory when creating a new BS. | N/A* | ■ 0-11 for bw=5MHz<br>■ 0-29 for bw=7 or 10 MHz |
| [ert-poll-enable {true \| false} ] | Defines the BS's behavior upon reception of zero size BW requests. | Optional | true | ■ true<br>■ False |

**Command Modes**

bs configuration mode

* The default value for the mandatory max-cqi parameter is be 7 for bw=5MHz and 19 for bw=7 or 10 MHz.

### 4.7.7.2 Restoring the Default Values of Feedback Allocation Parameters

To restore one or all of the Feedback Allocation non-mandatory parameters to their default values, run the following command:

**npu(config-bs-66053)# no feedbackalloc** [pr-cdma ] [ir-cdma ] [ert-poll-enable]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the pr-cdma and ir-cdma parameters to the default values, run the following command:

**npu(config-bs-66053)# no feedbackalloc pr-cdma ir-cdma**

These parameters will be restored to their default value, while the other parameters will remain unchanged.

To restore all Feedback Allocation non-mandatory parameters to their default value, run the following command:

**npu(config-bs-66053)# no feedbackalloc**

**NOTE**

Refer to Section 4.7.7.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no feedbackalloc** [pr-cdma ] [ir-cdma ] [ert-poll-enable] |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.7.3 Displaying Configuration Information for Feedback Allocation Parameters

To display configuration information for Feedback Allocation parameters, run the following command:

**npu# show feedbackalloc bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Feedback Allocation parameters of BS 66053, run the following command:

**npu# show feedbackalloc bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show feedbackalloc bs**

**Command Syntax**

**npu# show feedbackalloc bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display Feedback Allocation parameters of a specific BS. Do not specify a value for this parameter if you want to display Feedback Allocation parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
PRCDMAAllocationsPeriod(frames)          :<value>
IRCDMAAllocationsPeriod(frames)          :<value>
MaximumCQIRegionSize(subchannels)        :<value>
```

**Command Modes**

Global command mode

## 4.7.8 Managing Neighbor Advertisement Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Neighbor Advertisement parameters (refer to Section 4.7.8.1).
- Restore the default values of one or all of the Neighbor Advertisement parameters (refer to Section 4.7.8.2).

You can display configuration information for the Neighbor Advertisement parameters of a selected or all existing BSs (refer to Section 4.7.8.3).

### 4.7.8.1 Configuring Neighbor Advertisement Parameters

**To configure the Neighbor Advertisement Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# nbradvertise** [mininterval-normalload <(0 to 100 StepSize 0.1)> ] [mininterval-highload <(0 to 100 StepSize 0.1)> ] [triggersetup <(0 to 100 StepSize 0.1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Neighbour Advertisement parameters must be configured explicitly (even if configured to the default value).

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# nbradvertise** [mininterval-normalload <(0 to 100 StepSize 0.1)> ] [mininterval-highload <(0 to 100 StepSize 0.1)> ] [triggersetup <(0 to 100 StepSize 0.1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | [mininterval-normalload <(0 to 100 StepSize 0.1)> ] | The minimum interval (in seconds) between NBRADV transmissions in normal load state. | Optional | 0.5 | 0 -100 in steps of 0.1 |
| | [mininterval-highload <(0 to 100 StepSize 0.1)> ] | The minimum interval (in seconds) between NBRADV transmissions in high load state. | Optional | 4 | 0 -100 in steps of 0.1 |
| | [triggersetup <(0 to 100 StepSize 0.1)> ] | The periodic NBRADV transmission interval, in seconds | Optional | 10 | 0 - 100 in steps of 0.1 |

**Command Modes** bs configuration mode

### 4.7.8.2 Restoring the Default Values of Neighbor Advertisement Parameters

To restore one or all of the Neighbor Advertisement parameters to their default values, run the following command:

npu(config-bs-66053)# no nbradvertise [mininterval-normalload] [mininterval-highload] [triggersetup]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the mininterval-normalload parameters to the default values, run the following command:

**npu(config-bs-66053)# no nbradvertise mininterval-normalload**

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Neighbor Advertisement parameters to their default value, run the following command:

**npu(config-bs-66053)# no nbradvertise**

**NOTE**

Refer to Section 4.7.8.1 for a description and default values of these parameters.

**Command Syntax** **npu(config-bs-66053)# no nbradvertise** `[mininterval-normalload] [mininterval-highload] [triggersetup]`

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | bs configuration mode |

### 4.7.8.3 Displaying Configuration Information for Neighbor Advertisement Parameters

To display configuration information for Neighbor Advertisement parameters, run the following command:

**npu# show nbradvertise bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Neighbor Advertisement parameters of BS 66053, run the following command:

**npu# show nbradvertise bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show nbradvertise bs**

| | |
|---|---|
| **Command Syntax** | **npu# show nbradvertise bs** [<(1 to 16777215 StepSize 1) |

| | |
|---|---|
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display Neighbour Advertisement parameters of a specific BS. Do not specify a value for this parameter if you want to display Neighbour Advertisement parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
MinimumInterval-NormalLoad               :<value>
MinimumInterval-HighLoad                 :<value>
PeriodicInterval                         :<value>
```

**Command Modes**

Global command mode

## 4.7.9 Managing Triggers Parameters

After enabling the BS configuration mode, you can configure one or more of the Triggers parameters (refer to Section 4.7.9.1).

You can display configuration information for the Triggers parameters of a selected or all existing BSs (refer to Section 4.7.9.2).

### 4.7.9.1 Configuring Triggers Parameters

**To configure the Triggers Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# triggers-**<trigger-name> <trigger-range>

Each Trigger is configured separately. This is the general structure of the command.

**IMPORTANT**

When creating a new BS, at least one of the Triggers parameters must be configured explicitly.

**Command Syntax**

**npu(config-bs-66053)# triggers-**`<trigger-name> <trigger-range>`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <trigger-name> | The Trigger name. | Mandatory | N/A | See Table 4-49 below |
| <trigger-value> | Defines the threshold value for the Trigger. | Mandatory | N/A | See Table 4-49 below |

**Command Modes**

bs configuration mode

**Table 4-49: Trigger Names and Possible Value Ranges**

| Trigger Name | Trigger Condition | Action | Possible Values |
|---|---|---|---|
| triggers-scnreq-cinr-min | The C/N at the Serving BS is below the Trigger threshold (in dB) | Scan Request | -64 to 63.5 in steps of 0.5 |
| triggers-scnreq-rssi-min | The RSSI at the Serving BS is below the Trigger thresholdd (in Bm) | | -103.75 to -40 in steps of 0.25 |
| triggers-scnreq-rtd-max | The Serving BS distance from the MS (calculated by measuring the round trip delay) is above the Trigger threshold (in meter) | | 0-3400 in steps of 50 if BS BW is 10 MHz, 0-6800 in steps of 50 if BS BW is 5 MHz, 0-4800 in steps of 50 if BS BW is 7 MHz |

**Table 4-49: Trigger Names and Possible Value Ranges**

| Trigger Name | Trigger Condition | Action | Possible Values |
|---|---|---|---|
| triggers-horeq-cinr-margin | The C/N at the Neighbour BS minus the C/N at the Serving BS is above the Trigger threshold (in dB) | Handover Request | -64 to 63.5 in steps of 0.5 |
| triggers-horeq-cinr-max | The C/N at the Neighbour BS is above the Trigger threshold (in dB) | | -64 to 63.5 in steps of 0.5 |
| triggers-horeq-cinr-min | The C/N at the Serving BS is below the Trigger threshold (in dB) | | -64 to 63.5 in steps of 0.5 |
| triggers-horeq-rssi-margin | The RSSI at the Neighbour BS minus the RSSI at the Serving BS is above the Trigger threshold (in dBm) | | -32 to 31.75 in steps of 0.25 |
| triggers-horeq-rssi-max | The RSSI at the Neighbour BS is above the Trigger threshold (in dBm) | | -103.75 to -40 in steps of 0.25 |
| triggers-horeq-rssi-min | The RSSI at the Serving BS is below the Trigger threshold (in dBm) | | -103.75 to -40 in steps of 0.25 |
| triggers-horeq-rtd-max | The Serving BS distance from the MS (calculated by measuring the round trip delay) is above the Trigger threshold (in meter) | | 0-3400 in steps of 50 if BS BW is 10 MHz, 0-6800 in steps of 50 if BS BW is 5 MHz, 0-4800 in steps of 50 if BS BW is 7 MHz |

### 4.7.9.2 Displaying Configuration Information for Triggers Parameters

To display configuration information for Triggers parameters, run the following command:

**npu# show triggers bs** [<(1 to 16777215 StepSize 1)> TrigName {scnReqCinrMin | scnReqRssiMin | scnReqRtdMax | hoReqCinrMaxNbs | hoReqRssiMaxNbs | hoReqCinrMargin | hoReqRssiMargin | hoReqRtdMax | hoReqCinrMinSbs | hoReqRssiMinSbs} ]

Specify the BS ID and Trigger name if you want to display configuration for a particular Trigger. For example, to display the scnReqCinrMin parameters of BS 66053, run the following command:

**npu# show triggers bs 66053 TrigName scnReqCinrMin**

Do not specify these parameters if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show triggers bs**

**Command Syntax**

**npu# show triggers bs** [<(1 to 16777215 StepSize 1)> TrigName {scnReqCinrMin | scnReqRssiMin | scnReqRtdMax | hoReqCinrMaxNbs | hoReqRssiMaxNbs | hoReqCinrMargin | hoReqRssiMargin | hoReqRtdMax | hoReqCinrMinSbs | hoReqRssiMinSbs} ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display a specific Trigger of a specific BS. Do not specify a value for this parameter if you want to display all Triggers parameters of all BSs. | Optional | N/A | 1-16777215 |
| TrigName {scnReqCinrMin \| scnReqRssiMin \| scnReqRtdMax \| hoReqCinrMaxNbs \| hoReqRssiMaxNbs \| hoReqCinrMargin \| hoReqRssiMargin \| hoReqRtdMax \| hoReqCinrMinSbs \| hoReqRssiMinSbs} ] | The Trigger name<br>Specify only if you want to display a specific Trigger of a specific BS. Do not specify if you want to display all Triggers parameters of all BSs | | | ■ scnReqCinrMin<br>■ scnReqRssiMin<br>■ scnReqRtdMax<br>■ hoReqCinrMaxNbs<br>■ hoReqRssiMaxNbs<br>■ hoReqCinrMargin<br>■ hoReqRssiMargin<br>■ hoReqRtdMax<br>■ hoReqCinrMinSbs<br>■ hoReqRssiMinSbs} |

| | | |
|---|---|---|
| **Display Format** (for a selected Trigger) | `BSIDLSB` | `:<value>` |
| | `scnReqRssiMin` | `:<value>` |

| | |
|---|---|
| **Command Modes** | Global command mode |

## 4.7.10 Managing Trigger Setup Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Trigger Setup parameters (refer to Section 4.7.10.1).
- Restore the default values of one or all of the Trigger Setup parameters (refer to Section 4.7.10.2).

You can display configuration information for the Trigger Setup parameters of a selected or all existing BSs (refer to Section 4.7.10.3).

### 4.7.10.1 Configuring Trigger Setup Parameters

**To configure the Trigger Setup Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# triggersetup** [hysteresismargin <(0 to 255 StepSize 1)> ] [timetotrigger <(0 to 255 StepSize 1)> ] [avgduration-rssi <(0 to 255 StepSize 1)> ] [avgduration-cinr <(0 to 255 StepSize 1)> ] [avgduration-rtd <(0 to 255 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Trigger Setup parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053)# triggersetup [hysteresismargin <(0 to 255 StepSize 1)> ] [timetotrigger <(0 to 255 StepSize 1)> ] [avgduration-rssi <(0 to 255 StepSize 1)> ] [avgduration-cinr <(0 to 255 StepSize 1)> ] [avgduration-rtd <(0 to 255 StepSize 1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [hysteresismargin <(0 to 255 StepSize 1)> ] | The CINR hysteresis in dB for adding or deleting neighbors. The hysteresis margin is used by the MS in the decision whether to include a neighbor BS in a list of possible target BSs. | Optional | 5 | 0 - 255 |
| [timetotrigger <(0 to 255 StepSize 1)> ] | The minimum time in milliseconds between adding or deleting a neighbor. It is the time that the MS takes to decide whether to select a neighbor BS as a possible target BS and is applicable only for HHO. | Optional | 50 | 0 - 255 |
| [avgduration-rssi <(0 to 255 StepSize 1)> ] | The default RSSI average duration for triggers, in milliseconds | Optional | 50 | 0 - 255 |
| [avgduration-cinr <(0 to 255 StepSize 1)> ] | The default CINR average duration for triggers, in milliseconds | Optional | 50 | 0 - 255 |
| [avgduration-rtd <(0 to 255 StepSize 1)> ] | The default RTD average duration for triggers, in milliseconds | Optional | 50 | 0 - 255 |

**Command Modes**

bs configuration mode

### 4.7.10.2 Restoring the Default Values of Trigger Setup Parameters

To restore one or all of the Trigger Setup parameters to their default values, run the following command:

**npu(config-bs-66053)# no triggersetup** [hysteresismargin ] [timetotrigger ] [avgduration-rssi] [avgduration-cinr] [avgduration-rtd ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the hysteresismargin parameter to the default value, run the following command:

**npu(config-bs-66053)# no triggersetup hysteresismargin**

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Trigger Setup parameters to their default value, run the following command:

**npu(config-bs-66053)# no triggersetup**

**NOTE**

Refer to Section 4.7.10.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no triggersetup** [hysteresismargin ] [timetotrigger ] [avgduration-rssi] [avgduration-cinr] [avgduration-rtd ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.10.3 Displaying Configuration Information for Trigger Setup Parameters

To display configuration information for Trigger Setup parameters, run the following command:

**npu# show triggersetup bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Trigger Setup parameters of BS 66053, run the following command:

**npu# show triggersetup bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show triggersetup bs**

**Command Syntax**

**npu# show triggersetup bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display Trigger Setup parameters of a specific BS. Do not specify a value for this parameter if you want to display Trigger Setup parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
HysteresisMargin(dB)                     :<value>
TimetoTrigger(msec)                      :<value>
AverageDurationofDefaultRSSI(msec)       :<value>
AverageDurationofDefaultCINR(msec)       :<value>
AverageDurationofDefaultRTD(msec)        :<value>
```

**Command Modes**

Global command mode

## 4.7.11 Managing Scan Negotiation Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Scan Negotiation parameters (refer to Section 4.7.11.1).
- Restore the default values of some or all of the Scan Negotiation parameters (refer to Section 4.7.11.2).

You can display configuration information for the Scan Negotiation parameters of a selected or all existing BSs (refer to Section 4.7.11.3).

### 4.7.11.1 Configuring Scan Negotiation Parameters

**To configure the Scan Negotiation Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# scanning** [max-attempts <(0 to 255 StepSize 1)> ] [interval <(0 to 100 StepSize 0.1)> ] [enable-autoaccept {TRUE | FALSE} ] [enable-modify {TRUE | FALSE} ] [min-interval <(2 to 255 StepSize 1)> ] [max-duration <(0 to 255 StepSize 1)> ] [min-degradationfactor <(0 to 1 StepSize 0.1)> ] [honegotiation-sbs <(0 to 255 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Scan Negotiation parameters must be configured explicitly (even if configured to the default value).

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# scanning** [max-attempts <(0 to 255 StepSize 1)> ] [interval <(0 to 100 StepSize 0.1)> ] [enable-autoaccept {TRUE \| FALSE} ] [enable-modify {TRUE \| FALSE} ] [min-interval <(2 to 255 StepSize 1)> ] [max-duration <(0 to 255 StepSize 1)> ] [min-degradationfactor <(0 to 1 StepSize 0.1)> ] [honegotiation-sbs <(0 to 255 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [max-attempts <(0 to 255 StepSize 1)> ] | The maximum allowed number of consecutive MOB_SCN-REQs . | Optional | 10 | 0 - 255 |
| [interval <(0 to 100 StepSize 0.1)> ] | The measuring interval for counting MOB_SCN-REQs abuse. | Optional | 1 | 0 to 100 secs in steps of 0.1 |
| [enable-autoaccept {TRUE \| FALSE} ] | Determine whether all scan profiles requested by MSs will be accepted automatically.<br>**Note:** If TRUE all scan request will be automatically accepted. | Optional | TRUE | ■ TRUE<br>■ FALSE |
| [enable-modify {TRUE \| FALSE} ] | Determines whether the BS will modify unfeasible scan profiles requested by MSs.<br>**Note:** If TRUE the BS will modify unfeasible scan profile requests and if FALSE the BS will deny the requests. | Optional | TRUE | ■ TRUE<br>■ FALSE |
| [min-interval <(2 to 255 StepSize 1)> ] | The minimum interleaving interval permitted to the MS in the scan profile (in frames) | Optional | 2 | 0 - 255 |
| [max-duration <(0 to 255 StepSize 1)> ] | The maximum duration of a scan permitted to the MS in the scan profile (in frames). | Optional | 255 | 0 - 255 |
| [min-degradationfactor <(0 to 1 StepSize 0.1)> ] | The minimum bandwidth degradation factor allowed in the scan profile | Optional | 0 | 0 to 1 in steps of 0.1 |
| [honegotiation-sbs <(0 to 255 StepSize 1)> ] | The minimum value (in frames) for the start frame in the scan profile. | Optional | 0 | 0 - 255 |

**Command Modes**

bs configuration mode

### 4.7.11.2 Restoring the Default Values of Scan Negotiation Parameters

To restore some or all of the Scan Negotiation parameters to their default values, run the following command:

**npu(config-bs-66053)# no scanning** [max-attempts ] [interval ] [enable-autoaccept ] [enable-modify ][min-interval ] [max-duration ] [min-degradationfactor ] [honegotiation-sbs ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the max-attempts parameter to the default value, run the following command:

**npu(config-bs-66053)# no scanning max-attempts**

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Scan Negotiation parameters to their default value, run the following command:

**npu(config-bs-66053)# no scanning**

**NOTE**

Refer to Section 4.7.11.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no scanning** `[max-attempts ] [interval ] [enable-autoaccept ] [enable-modify ][min-interval ] [max-duration ] [min-degradationfactor ] [honegotiation-sbs ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.11.3 Displaying Configuration Information for Scan Negotiation Parameters

To display configuration information for Scan Negotiation parameters, run the following command:

**npu# show scanning bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Scan Negotiation parameters of BS 66053, run the following command:

**npu# show scanning bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show scanning bs**

**Command Syntax**

**npu# show scanning bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display Scan Negotiation parameters of a specific BS. Do not specify a value for this parameter if you want to display Scan Negotiation parameters of all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format** (for each existing BS if requested for all BSs) | `BSIDLSB :<value>`<br>`MaximumAttempts :<value>`<br>`MeasuringInterval(sec) :<value>`<br>`EnableAutoAcceptProfile :<value>`<br>`EnableModifyProfile :<value>`<br>`MinimumInterleavingInterval(frames) :<value>`<br>`MaximumScanDuration(frames) :<value>`<br>`MinimumBandwidthDegradationFactor :<value>`<br>`MinimumStartFrame(frames) :<value>` |
| **Command Modes** | Global command mode |

## 4.7.12 Managing Handover Negotiation at SBS Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Handover Negotiation at SBS parameters (refer to Section 4.7.12.1).
- Restore the default values of some or all of the Handover Negotiation at SBS parameters (refer to Section 4.7.12.2).

You can display configuration information for the Handover Negotiation at SBS parameters of a selected or all existing BSs (refer to Section 4.7.12.3).

### 4.7.12.1 Configuring Handover Negotiation at SBS Parameters

**To configure the Handover Negotiation at SBS Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# honegotiation-sbs** [selectcoefficient <(0 to 10 StepSize 0.1)> ] [max-tbs <(0 to 255 StepSize 1)> ] [min-actiontime <(0 to 255 StepSize 1)> ] [max-actiontime <(0 to 255 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Handover Negotiation at SBS parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053)# honegotiation-sbs [selectcoefficient <(0 to 10 StepSize 0.1)> ] [max-tbs <(0 to 255 StepSize 1)> ] [min-actiontime <(0 to 255 StepSize 1)> ] [max-actiontime <(0 to 255 StepSize 1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [selectcoefficient <(0 to 10 StepSize 0.1)> ] | The coefficient for selection of Target BSs for MOB_BSHO-RSP | Optional | 0.3 | 0 to 10 in steps of 0.1 |
| [max-tbs <(0 to 255 StepSize 1)> ] | The naximum number of Target BSs to which to send HO-REQ message through the backbone. | Optional | 255 | 0 - 255 |
| [min-actiontime <(0 to 255 StepSize 1)> ] | The minimum acceptable action time in the Serving BS (in frames) | Optional | 1 | 0 - 255 |
| [max-actiontime <(0 to 255 StepSize 1)> ] | The maximum acceptable action time in the Serving BS (in frames) | Optional | 255 | 0 - 255 |

**Command Modes**

bs configuration mode

## 4.7.12.2 Restoring the Default Values of Handover Negotiation at SBS Parameters

To restore some or all of the Handover Negotiation at SBS parameters to their default values, run the following command:

**npu(config-bs-66053)# no honegotiation-sbs** [selectcoefficient ] [max-tbs ] [min-actiontime ] [max-actiontime ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the max-tbs parameter to the default value, run the following command:

**npu(config-bs-66053)# no honegotiation-sbs max-tbs**

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Handover Negotiation at SBS parameters to their default value, run the following command:

**npu(config-bs-66053)# no honegotiation-sbs**

**NOTE**

Refer to Section 4.7.12.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no honegotiation-sbs** `[selectcoefficient ] [max-tbs ] [min-actiontime ] [max-actiontime ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.12.3 Displaying Configuration Information for Handover Negotiation at SBS Parameters

To display configuration information for Handover Negotiation at SBS parameters, run the following command:

**npu# show honegotiation-sbs bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Handover Negotiation at SBS parameters of BS 66053, run the following command:

**npu# show honegotiation-sbs bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show honegotiation-sbs bs**

**Command Syntax**

**npu# show honegotiation-sbs bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display Handover Negotiation at SBS parameters of a specific BS. Do not specify a value for this parameter if you want to display Handover Negotiation at SBS parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
```

**Command Modes**

Global command mode

## 4.7.13 Managing Handover Negotiation at TBS Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Handover Negotiation at TBS parameters (refer to Section 4.7.13.1).
- Restore the default values of some or all of the Handover Negotiation at TBS parameters (refer to Section 4.7.13.2).

You can display configuration information for the Handover Negotiation at TBS parameters of a selected or all existing BSs (refer to Section 4.7.13.3).

### 4.7.13.1 Configuring Handover Negotiation at TBS Parameters

**To configure the Handover Negotiation at TBS Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# honegotiation-tbs** [defaultactiontime <(0 to 255 StepSize 1)> ] [fastrangingalloc <(0 to 255 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Handover Negotiation at TBS parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053)# honegotiation-tbs [defaultactiontime <(0 to 255 StepSize 1)> ] [fastrangingalloc <(0 to 255 StepSize 1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| defaultactiontime <(0 to 255 StepSize 1)> | The number of frames until allocation of non-contention based ranging opportunity at target BS. | Optional | 3 | 0 - 255 |
| fastrangingalloc <(0 to 255 StepSize 1)> | The number of consecutive fast ranging opportunities the target BS will allocate to an incoming HO MS. | Optional | 2 | 0 - 255 |

**Command Modes**

bs configuration mode

### 4.7.13.2 Restoring the Default Values of Handover Negotiation at TBS Parameters

To restore some or all of the Handover Negotiation at TBS parameters to their default values, run the following command:

**npu(config-bs-66053)# no honegotiation-tbs** [defaultactiontime ] [fastrangingalloc ]

You can restore only one parameter to the default values by specifying only that parameters. For example, to restore only the fastrangingalloc parameter to the default value, run the following command:

**npu(config-bs-66053)# no honegotiation-tbs fastrangingalloc**

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Handover Negotiation at TBS parameters to their default value, run the following command:

**npu(config-bs-66053)# no honegotiation-tbs**

**NOTE**

Refer to Section 4.7.13.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no honegotiation-stbs** `[defaultactiontime ] [fastrangingalloc ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.13.3 Displaying Configuration Information for Handover Negotiation at TBS Parameters

To display configuration information for Handover Negotiation at TBS parameters, run the following command:

**npu# show honegotiation-tbs bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Handover Negotiation at TBS parameters of BS 66053, run the following command:

**npu# show honegotiation-tbs bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show honegotiation-tbs bs**

**Command Syntax**

**npu# show honegotiation-tbs bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display Handover Negotiation at TBS parameters of a specific BS. Do not specify a value for this parameter if you want to display Handover Negotiation at TBS parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
DefaultActionTime(frames)                :<value>
FastRangingallocations                   :<value>
```

**Command Modes**

Global command mode

## 4.7.14 Managing Neighbor BSs

**To configure a Neighbor BS:**

1. Enable the Neighbour BS configuration mode for the selected Neighbour BS (refer to Section 4.7.14.1)
2. You can now execute any of the following tasks:
   - Configure one or more of the parameters tables of the Neighbor BS (refer to Section 4.7.14.2)
   - Restore the default values of parameters in one or more of the parameters tables of the Neighbor BS (refer to Section 4.7.14.3)
   - Terminate the Neighbor BS configuration mode (refer to Section 4.7.14.4)

In addition, you can, at any time, display configuration information for each of the parameters tables of the Neighbour BS (refer to Section 4.7.14.6) or delete an existing Neighbor BS (refer to Section 4.7.14.5).

### 4.7.14.1 Enabling the Neighbor BS Configuration Mode\Creating a Neighbor BS

To configure the parameters of a Neighbour BS, first enable the Neighbour BS configuration mode for the specific Neighbour BS. Run the following command to enable the Neighbour BS configuration mode. You can also use this command to create a new Neighbour BS.

```
npu(config-bs-66053)# nbr <(1 to 16777215 StepSize 1)>
```

Note that for a new Neighbour BS this command only defines the Neighbour BS ID, and that the Neighbour BS is not fully created until completing configuration of all mandatory parameters and executing the **apply** command (must be executed before exiting the Neighbour BS configuration mode). Also when updating an existing Neighbour BS, the **apply** command must be executing prior to termination the Neighbour BS configuration mode.

For example, to define a new Neighbour BS with a BS ID 66055, or to enable the configuration mode for Neighbour BS 66055, run the following command:

```
npu(config-bs-66053)# nbr 66055
```

If you use this command to create a new Neighbour BS, the configuration mode for this Neighbour BS is automatically enabled, after which you can execute any of the following tasks:

- Configure one or more of the parameters tables of the Neighbour BS (refer to Section 4.7.14.2)
- Restore the default values of parameters in one or more of the parameters tables of the Neighbour BS (refer to Section 4.7.14.3)

After executing the above tasks, you can terminate the Neighbour BS configuration mode (refer to Section 4.7.14.4) and return to the BS configuration mode.

Note that for properly completing the configuration of a Neighbour BS the **apply** command must be executed prior to exiting the Neighbour BS configuration mode.

**Command Syntax**

```
npu(config-bs-66053)# nbr <(1 to 16777215 StepSize 1)>
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| nbr <(1 to 16777215 StepSize 1)> | The BS ID (BSIDLSB) of the Neighbour BS | Mandatory | | 1 - 16777215 |

**Command Modes**

bs configuration mode

For example, to define Neighbor BS 66055 for bs-68000, run the following command:

```
npu(config-bs-66053)# nbr 68000
```

**NOTE**

The following examples are for Neighbour BS configuration mode for bs-66053, neighbour bs (nbr) 68000.

## 4.7.14.2 Configuring Neighbor BS Parameters

After enabling the Neighbor BS configuration mode you can configure the following parameters tables:

- General (refer to Section 4.7.14.2.1)
- Required C/N Level (refer to Section 4.7.14.2.2)
- Trigger Setup (refer to Section 4.7.14.2.3)
- Triggers (refer to Section 4.7.14.2.4)

**IMPORTANT**

After completing the Neighbour BS configuration,do not forget to execute the apply command before exiting the Neighbour BS configuration mode:

**npu(config-bs-66053-nbr-68000)# apply**

### 4.7.14.2.1 Configuring General Neighbor BS Parameters

The General Neighbor BS Parameters table enables defining the general parameters of the Neighbor BS.

To configure the General Neighbor BS parameters, run the following command:

**npu(config-bs-66053-nbr-68000)# general** [syncind {unsynchronized | timeSynchronized | timeAndFrequencySynchronized}] [eirp <(-128 to 127 StepSize 1)>] [srvcsupport <hex-string>] [bw {fiveMHz | tenMHz | sevenMHz}] [feedbackzone-permbase <(0 to 69 StepSize 1)>] [ucd-configchangecount <(0 to 255 StepSize 1)>] [dcd-configchangecount <(0 to 255 StepSize 1)>] [eirx-pir-max <(-140 to -40 StepSize 1)>] [frequency <(2302.5 to 2357.5 StepSize 0.125) | (2498.5 to 2687.5 StepSize 0.125) | (3402.5 to 3597.5 StepSize 0.125) | (3602.5 to 3797.5 StepSize 0.125)>] [restartcount <(0 to 255 StepSize 1)>] [preamble-idx <(0 to 113 StepSize 1)>]

**IMPORTANT**

When creating a new Neighbour BS, all mandatory Neighbour BS General parameters must be configured.

**Command Syntax**

```
npu(config-bs-66053-nbr-68000)# general [syncind {unsynchronized | timeSynchronized | timeAndFrequencySynchronized} ] [eirp <(-128 to 127 StepSize 1)> ] [srvcsupport <hex-string>] [bw {fiveMHz | tenMHz | sevenMHz} ] [feedbackzone-permbase <(0 to 69 StepSize 1)> ] [ucd-configchangecount <(0 to 255 StepSize 1)>] [dcd-configchangecount <(0 to 255 StepSize 1)> ] [eirx-pir-max <(-140 to -40 StepSize 1)> ] [frequency <(2302.5 to 2357.5 StepSize 0.125) | (2498.5 to 2687.5 StepSize 0.125) | (3402.5 to 3597.5 StepSize 0.125) | (3602.5 to 3797.5 StepSize 0.125)> ] [restartcount <(0 to 255 StepSize 1)>] [preamble-idx <(0 to 113 StepSize 1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [syncind {unsynchronized \| timeSynchronized \| timeAndFrequency Synchronized} ] | Time/Frequency synchronization indicator.<br>In the current release should always be set to timeAndFrequencySynchronized. | Optional | timeAndFrequencySynchronized | ■ unsynchronized<br>■ timeSynchronized<br>■ timeAndFrequency Synchronized |
| [eirp <(-128 to 127 StepSize 1)> ] | Neighbour BS EIRP | Mandatory When creating a new Neighbour BS. | N/A | -128 to 127 |

| | | | | | |
|---|---|---|---|---|---|
| | [srvcsupport <hex-string>] | Scheduling Service Support. Two hexadeximal digits that can be presented as 8 bits where tbits 5-7 are always 0. Bits 0-4 indicate whether specific services are supported, where a value of 1 means that the service is supported: UGS (0), RT-PS(1), NRT-PS(2), BE(3), ERT-PS(4).<br><br>Should be taken from the displayed information for Handover Control (hoctrl) in the relevant BS (see Section 4.7.23.3. | Optional | c8<br><br>(11001000, meaning that the BS supports UGS, RT-PS and ERT-PS scheduling services). | Two hexadecimal digits. |
| | [bw {fiveMHz \| tenMHz \| sevenMHz} ] | The bandwidth of neighbour BS.<br><br>Should be taken from Baseband bandwidth parameter of the relevant BS (see Section 4.7.18.2) | Mandatory When creating a new Neighbour BS. | N/A | ■ fiveMHz<br><br>■ tenMHz<br><br>■ sevenMHz |
| | [feedbackzone-permbase <(0 to 69 StepSize 1)> ] | The first uplink zone permutation base of the neighbor BS.<br><br>In current release this equals the feedback zone permutation base (see Section 4.7.19.5.8) | Mandatory When creating a new Neighbour BS. | N/A | 0 - 69 |
| | [ucd-configchangecount <(0 to 255 StepSize 1)>] | UCD configuration change count of neighbor BS<br><br>Should be taken from displayed UCD information for the relevant BS (see Section 4.7.15.3 | Mandatory When creating a new Neighbour BS. | N/A | 0 - 255 |

| | | | | |
|---|---|---|---|---|
| [dcd-configchangecount <(0 to 255 StepSize 1)> ] | DCD configuration change count of neighbor BS<br>Should be taken from displayed DCD information for the relevant BS (see Section 4.7.16.3 | Mandatory When creating a new Neighbour BS. | N/A | 0 - 255 |
| eirx-pir-max <(-140 to -40 StepSize 1)> | The required effective isotropic received power at the Neighbor BS for Initial ranging, in dBm.<br>Should be taken from Power Control maxeirxp (see Section 4.7.6.2.2) | Optional | -124 | -140 to -40 |
| [frequency <(2302.5 to 2357.5 StepSize 0.125) \| (2498.5 to 2687.5 StepSize 0.125) \| (3402.5 to 3597.5 StepSize 0.125) \| (3602.5 to 3797.5 StepSize 0.125)> ] | Downlink center frequency of neighbor BS.<br>Should be taken from RF frequency parameter of the relevant BS (see Section 4.7.17.2) | Mandatory When creating a new Neighbour BS. | N/A | ■ 2302.5 to 2357.5 in steps of 0.125)<br>■ 2498.5 to 2687.5 in steps of 0.125<br>■ 3402.5 to 3597.5 in steps of 0.125<br>■ 3602.5 to 3797.5 in steps of 0.125 |
| restartcount <(0 to 255 StepSize 1)> ] | This value is incremented by one whenever the neighbor BS restarts.<br>Should be taken from displayed DCD information for the relevant BS (see Section 4.7.16.3 | Mandatory When creating a new Neighbour BS. | N/A | 0 - 255 |

| | | | | | |
|---|---|---|---|---|---|
| | [preamble-idx <(0 to 113 StepSize 1)> ] | Neighbour BS Preamble Index.<br><br>Should be the same as preamble-idx in displayed information of Airframe General parameters of the relevant BS (see Section 4.7.19.5.1 | Mandatory When creating a new Neighbour BS. | N/A | 0 - 113 |

**Command Modes** bs neighbour bs configuration mode

### 4.7.14.2.2 Configuring the Neighbor BS Required C/N Level Parameters

The Neighbor BS Required C/N Levels table enables defining the Carrier to Noise Ratios required for various types of transmissions.

The configured values should be the same as those defined for the applicable Power Control Required C/N Level parameters (see Section 4.7.6.5.3) in the neighbor BS.

To configure the Neighbor BS Required C/N Levels, run the following command:

**npu(config-bs-66053-nbr-68000)# requiredcnr** [ack <(-20 to 50 StepSize 1)> ] [cqi <(-20 to 50 StepSize 1)> ] [cdma <(-20 to 50 StepSize 1)> ] [qpsk-1by2 <(-20 to 50 StepSize 1)> ] [qpsk-3by4 <(-20 to 50 StepSize 1)> ] [qam16-1by2 <(-20 to 50 StepSize 1)> ] [qam16-3by4 <(-20 to 50 StepSize 1)> ] [qam64-1by2 <(-20 to 50 StepSize 1)> ] [qam64-2by3 <(-20 to 50 StepSize 1)> ] [qam64-3by4 <(-20 to 50 StepSize 1)> ] [qam64-5by6 <(-20 to 50 StepSize 1)> ]

**IMPORTANT**

When creating a new Neighbour BS, at least one of the Neighbour BS Required C/N Level parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-nbr-68000)# requiredcnr [ack <(-20 to 50
StepSize 1)> ] [cqi <(-20 to 50 StepSize 1)> ] [cdma <(-20 to 50
StepSize 1)> ] [qpsk-1by2 <(-20 to 50 StepSize 1)> ] [qpsk-3by4
<(-20 to 50 StepSize 1)> ] [qam16-1by2 <(-20 to 50 StepSize 1)> ]
[qam16-3by4 <(-20 to 50 StepSize 1)> ] [qam64-1by2 <(-20 to 50
StepSize 1)> ] [qam64-2by3 <(-20 to 50 StepSize 1)> ] [qam64-3by4
<(-20 to 50 StepSize 1)> ] [qam64-5by6 <(-20 to 50 StepSize 1)> ]
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [ack <(-20 to 50 StepSize 1)> ] | The C/N in dB required for sending ACK, reported by the Neighbour BS to the MS for power control purposes. | Optional | 7 | -20 to 50 |
| [cqi <(-20 to 50 StepSize 1)> ] | The C/N in dB required for sending CQI, reported by the Neighbour BS to the MS for power control purposes. | Optional | 0 | -20 to 50 |
| [cdma <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting CDMA, reported by the Neighbour BS to the MS for power control purposes. | Optional | 0 | -20 to 50 |
| [qpsk-1by2 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using QPSK 1/2, reported by the Neighbour BS to the MS for power control purposes. | Optional | 14 | -20 to 50 |
| [qpsk-3by4<(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using QPSK 3/4, reported by the Neighbour BS to the MS for power control purposes. | Optional | 16 | -20 to 50 |
| [qam16-1by2 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 16QAM 1/2, reported by the Neighbour BS to the MS for power control purposes. | Optional | 18 | -20 to 50 |
| [qam16-3by4 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 16QAM 3/4, reported by the Neighbour BS to the MS for power control purposes. | Optional | 22 | -20 to 50 |

| | | | | | |
|---|---|---|---|---|---|
| | qam64-1by2 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 64QAM 1/2, reported by the Neighbour BS to the MS for power control purposes. | Optional | 23 | -20 to 50 |
| | [qam64-2by3 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 64QAM 2/3, reported by the Neighbour BS to the MS for power control purposes. | Optional | 23 | -20 to 50 |
| | [qam64-3by4 <(-20 to 50 StepSize 1)> ] | The C/N in dB required for transmitting using 64QAM 3/4, reported by the Neighbour BS to the MS for power control purposes. | Optional | 23 | -20 to 50 |
| | [qam64-5by6 <(-20 to 50 StepSize 1)> ] | he C/N in dB required for transmitting using 64QAM 5/6, reported by the Neighbour BS to the MS for power control purposes. | Optional | 23 | -20 to 50 |

**Command Modes** bs neighbour bs configuration mode

### 4.7.14.2.3 Configuring Trigger Setup Parameters

To configure the Neighbor BS Trigger Setup parameters, run the following command:

**npu(config-bs-66053-nbr-68000)# triggersetup** [hysteresismargin <(0 to 255 StepSize 1)> ] [timetotrigger <(0 to 255 StepSize 1)> ] [avgduration-rssi <(0 to 255 StepSize 1)> ] [avgduration-cinr <(0 to 255 StepSize 1)> ] [avgduration-rtd <(0 to 255 StepSize 1)> ]

The configured values should be the same as those defined for the applicable Trigger Setup parameters (see Section 4.7.10.3) in the neighbor BS.

**IMPORTANT**

When creating a new Neighbour BS, at least one of the Neighbour BS Trigger Setup parameters must be configured explicitly (even if configured to the default value).

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-nbr-68000)# triggersetup** [hysteresismargin <(0 to 255 StepSize 1)> ] [timetotrigger <(0 to 255 StepSize 1)> ] [avgduration-rssi <(0 to 255 StepSize 1)> ] [avgduration-cinr <(0 to 255 StepSize 1)> ] [avgduration-rtd <(0 to 255 StepSize 1)> ] |
| **Privilege Level** | 10 |
| **Syntax Description** | Refer to Section 4.7.10.1 |
| **Command Modes** | bs neighbour bs configuration mode |

#### 4.7.14.2.4 Configuring Neighbor BS Triggers Parameters

To configure the Neighbor BS Triggers parameters, run the following command:

**npu(config-bs-66053-nbr-68000)# triggers-**<trigger-name> <trigger-range>

Each Trigger is configured separately. This is the general structure of the command.

The configured trigger names and values should be the same as those defined for the applicable Triggers parameters (see Section 4.7.9.2) in the neighbor BS.

**IMPORTANT**

When creating a new Neighbour BS, at least one of the Neighbour BS Trigges parameters must be configured.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-nbr-68000)# triggers-**<trigger-name> <trigger-range> |
| **Privilege Level** | 10 |
| **Syntax Description** | |

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| <trigger-name> | The Trigger name. | Mandatory | N/A | See Table 4-49 |
| <trigger-value> | Defines the threshold value for the Trigger. | Mandatory | N/A | See Table 4-49 |

**Command Modes** bs neighbour bs configuration mode

## 4.7.14.3 Restoring Default Values for Neighbor BS Configuration Parameters

After enabling the Neighbor BS configuration mode you can restore the default values for non-mandatory parameters in the following parameters tables:

- General (refer to Section 4.7.14.3.1)
- Required C/N Level (refer to Section 4.7.14.3.2)
- Trigger Setup (refer to Section 4.7.14.3.3)

### 4.7.14.3.1 Restoring the Default Values of Neighbor BS General Parameters

To restore one or all of the Neighbor BS non-mandatory General parameters to their default values, run the following command:

**npu(config-bs-66053-nbr-68000)# no general** [syncind ] [srvcsupport ] [eirx-pir-max]

You can restore only some parameters to the default values by specifying only those parameters. For example, to restore only the syncind to the default value, run the following command:

**npu(config-bs-66053-nbr-68000)# no general syncind**

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all non-mandatory parameters to their default value, run the following command:

**npu(config-bs-66053-nbr-68000)# no general**

**NOTE**

Refer to Section 4.7.14.2.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-nbr-68000)# no general** [syncind ] [srvcsupport][eirx-pir-max ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs neighbour bs configuration mode |

### 4.7.14.3.2 Restoring the Default Values of Neighbor BS Required C/N Level Parameters

To restore some or all of the Neighbor BS Required C/N Levels parameters to their default values, run the following command:

**npu(config-bs-66053-bs-68000)# no requiredcnr** [ack ] [cqi ] [cdma ] [qpsk-1by2 ] [qpsk-3by4 ] [qam16-1by2 ] [qam16-3by4 ] [qam64-1by2 ] [qam64-2by3 ] [qam64-3by4 ] [qam64-5by6 ]

You can restore only some parameters to their default values by specifying only those parameter. For example, to restore only the ack and cqi parameters to the default values, run the following command:

**npu(config-bs-66053-nbr-68000)# no requiredcnr ack cqi**

These parameters will be restored to their default value, while the other parameters will remain unchanged.

To restore all Neighbor BS Required C/N Levels parameters to their default value, run the following command:

**npu(config-bs-66053-nbr-68000)# no requiredcnr**

**NOTE**

Refer to Section 4.7.14.2.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-nbr-68000)# no requiredcnr** [ack ] [cqi ] [cdma ] [qpsk-1by2 ] [qpsk-3by4 ] [qam16-1by2 ] [qam16-3by4 ] [qam64-1by2 ] [qam64-2by3 ] [qam64-3by4 ] [qam64-5by6 ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs neighbour bs configuration mode |

### 4.7.14.3.3 Restoring the Default Values of Neighbor BS Trigger Setup Parameters

To restore some or all of the Neighbor BS Trigger Setup parameters to their default values, run the following command:

**npu(config-bs-66053-nbr-68000)# no triggersetup** [hysteresismargin ] [timetotrigger ] [avgduration-rssi] [avgduration-cinr] [avgduration-rtd ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the hysteresismargin parameter to the default value, run the following command:

**npu(config-bs-66053-nbr-68000)# no triggersetup hysteresismargin**

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Neighbor BS Trigger Setup parameters to their default value, run the following command:

**npu(config-bs-66053-nbr-68000)# no triggersetup**

**NOTE**

Refer to Section 4.7.14.2.3 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-nbr-68000)# no triggersetup** [hysteresismargin ] [timetotrigger ] [avgduration-rssi] [avgduration-cinr] [avgduration-rtd ] |
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | bs neighbour bs configuration mode |

### 4.7.14.4 Terminating the Neighbor BS Configuration Mode

Run the following command to terminate the Neighbor BS configuration mode:

**npu(config-bs-66053-nbr-68000)# exit**

**IMPORTANT**

Do not forget to execute the apply command before terminating the Neighbour BS configuration mode: **npu(config-bs-66053-nbr-68000)# apply**

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-nbr-68000)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | bs neighbour bs configuration mode |

### 4.7.14.5 Deleting a Neighbor BS

Run the following command from the BS configuration mode to delete a Neighbor BS:

**npu(config-bs 66053)# no nbr** <(1 to 16777215 StepSize 1)>

| | |
|---|---|
| **Command Syntax** | **npu(config-bs 66053)# no nbr** <(1 to 16777215 StepSize 1)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The Neighbour BS ID (bs-id-lsb) | Mandatory | N/A | 1-16777215 |

**Command Modes**

bs configuration mode

## 4.7.14.6 Displaying Configuration Information for Neighbor BS Parameters

You can display the current configuration information for the following Neighbor BS parameters tables:

- General (refer to Section 4.7.14.6.1)
- Required C/N Level (refer to Section 4.7.14.6.2)
- Trigger Setup (refer to Section 4.7.14.6.3)
- Triggers (refer to Section 4.7.14.6.4)
- All (refer to Section 4.7.14.6.5)

### 4.7.14.6.1 Displaying Configuration Information for Neighbor BS General Parameters

To display configuration for the Neighbor BS General parameters, run the following command:

**npu# show nbr-general bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> ]

Specify the BS ID and the Neighbor BS ID (bs-id-lsb) if you want to display configuration for a particular Neighbor BS in a particular BS. For example, to display the General parameters of Neighbor BS 68000 in BS 66503, run the following command:

**npu# show nbr-general bs 66053 bs-id-lsb 68000**

Do not specify these parameters if you want to view configuration information for all existing Neighbor BSs in all existing BSs. To display information for all Neighbor BSs in all BSs, run the following command:

**npu# show nbr-general bs**

**Command Syntax**

**npu# show nbr-general bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the General parameters of a specific Neighbour BS in a specific BS. Do not specify a value for this parameter if you want to display the General parameters of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |
| bs-id-lsb <(1 to 16777215 StepSize 1)> | The Neighbour BS ID.<br><br>Specify a value for this parameter if you want to display the General parameters of a specific Neighbour BS in a specific BS. Do not specify a value for this parameter if you want to display the General parameters of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |

| | | |
|---|---|---|
| **Display Format** (for each existing Neighbour BS in each of the existing BSs if requested for all) | BSIDLSB | :<value> |
| | NeighborBSIDLSB | :<value> |
| | SynchronizationIndicator | :<value> |
| | EIRP | :<value> |
| | SchedulingServiceSupport | :<value> |
| | Bandwidth(MHz) | :<value> |
| | UplinkFeedbackZonePermutationBase | :<value> |
| | UplinkDataZoneSub-ChannelsAllocated | :<value> |
| | UCDConfigurationChangeCount | :<value> |
| | DCDConfigurationChangeCount | :<value> |
| | IsotropicRecPwrForInitialRanging | :<value> |
| | CenterFrequency(MHz) | :<value> |
| | RestartCount | :<value> |
| | PreambleIndex | :<value> |

| | |
|---|---|
| **Command Modes** | Global command mode |

### 4.7.14.6.2 Displaying Configuration Information for Neighbor BS Required C/N Level Parameters

To display configuration for the Neighbor BS Required C/N Level parameters, run the following command:

**npu# show nbr-requiredcnr bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> ]

Specify the BS ID and the Neighbor BS ID (bs-id-lsb) if you want to display configuration for a particular Neighbor BS in a particular BS. For example, to display the Required C/N Level parameters of Neighbor BS 68000 in BS 66503, run the following command:

**npu# show nbr-requiredcnr bs 66053 bs-id-lsb 68000**

Do not specify these parameters if you want to view configuration information for all existing Neighbor BSs in all existing BSs. To display information for all Neighbor BSs in all BSs, run the following command:

**npu# show nbr-requiredcnr bs**

**Command Syntax**

**npu# show nbr-requiredcnr bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Required C/N Level parameters of a specific Neighbour BS in a specific BS. Do not specify a value for this parameter if you want to display the Required C/N Level parameters of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |
| bs-id-lsb <(1 to 16777215 StepSize 1)> | The Neighbour BS ID.<br><br>Specify a value for this parameter if you want to display the Required C/N Level parameters of a specific Neighbour BS in a specific BS. Do not specify a value for this parameter if you want to display the Required C/N Level parameters of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |

| | | |
|---|---|---|
| **Display Format** (for each existing Neighbour BS in each of the existing BSs if requested for all) | BSIDLSB | :<value> |
| | NeighborBSIDLSB | :<value> |
| | RequiredCNRforACK | :<value> |
| | RequiredCNRforCQI | :<value> |
| | RequiredCNRforCDMA | :<value> |
| | RequiredCNRforQPSK1/2 | :<value> |
| | RequiredCNRforQPSK3/4 | :<value> |
| | RequiredCNRfor16QAM1/2 | :<value> |
| | RequiredCNRfor16QAM3/4 | :<value> |
| | RequiredCNRfor64QAM1/2 | :<value> |
| | RequiredCNRfor64QAM2/3 | :<value> |
| | RequiredCNRfor64QAM3/4 | :<value> |
| | RequiredCNRfor64QAM5/6 | :<value> |

| | |
|---|---|
| **Command Modes** | Global command mode |

### 4.7.14.6.3 Displaying Configuration Information for Neighbor BS Trigger Setup Parameters

To display configuration for the Neighbor BS Trigger Setup parameters, run the following command:

**npu# show nbr-triggersetup bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> ]

Specify the BS ID and the Neighbor BS ID (bs-id-lsb) if you want to display configuration for a particular Neighbor BS in a particular BS. For example, to display the Trigger Setup parameters of Neighbor BS 68000 in BS 66503, run the following command:

**npu# show nbr-triggersetup bs 66053 bs-id-lsb 68000**

Do not specify these parameters if you want to view configuration information for all existing Neighbor BSs in all existing BSs. To display information for all Neighbor BSs in all BSs, run the following command:

**npu# show nbr-triggersetup bs**

**Command Syntax**

**npu# show nbr-triggersetup bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Trigger Setup parameters of a specific Neighbour BS in a specific BS. Do not specify a value for this parameter if you want to display the Trigger Setup parameters of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |
| bs-id-lsb <(1 to 16777215 StepSize 1)> | The Neighbour BS ID.<br><br>Specify a value for this parameter if you want to display the Trigger Setup parameters of a specific Neighbour BS in a specific BS. Do not specify a value for this parameter if you want to display the Trigger Setup parameters of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format**<br>(for each existing Neighbour BS in each of the existing BSs if requested for all) | `BSIDLSB :<value>`<br>`NeighborBSIDLSB :<value>`<br>`HysteresisMargin(dB) :<value>`<br>`TimetoTrigger(msec) :<value>`<br>`AverageDurationofDefaultRSSI(msec) :<value>`<br>`AverageDurationofDefaultCINR(msec) :<value>`<br>`AverageDurationofDefaultRTD(msec) :<value>` |
| **Command Modes** | Global command mode |

### 4.7.14.6.4 Displaying Configuration Information for Neighbor BS Triggers Parameters

To display configuration information for Neighbor BS Triggers parameters, run the following command:

**npu# show nbr-triggers bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> TrigName {scnReqCinrMin | scnReqRssiMin | scnReqRtdMax | scnRepCinrMaxNbs | scnRepRssiMaxNbs | scnRepCinrMargin | scnRepRssiMargin | scnRepRtdMax | scnRepCinrMinSbs | scnRepRssiMinSbs | hoReqCinrMaxNbs | hoReqRssiMaxNbs | hoReqCinrMargin | hoReqRssiMargin | hoReqRtdMax | hoReqCinrMinSbs | hoReqRssiMinSbs} ]

Specify the BS ID, Neighbour BS ID (bs-id-lsb) and Trigger name if you want to display configuration for a particular Trigger. For example, to display the scnReqCinrMin parameters of BS Neighbour 68000 in BS 66053, run the following command:

**npu# show nbr-triggers bs 66053 bs-id-lsb 68000 TrigName scnReqCinrMin**

Do not specify these parameters if you want to view configuration information for all existing Neighbour BSs in all BSs. To display information for all Neighbour BSs in all BSs, run the following command:

**npu# show nbr-triggers bs**

| | |
|---|---|
| **Command Syntax** | **npu# show nbr-triggers bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> TrigName {scnReqCinrMin \| scnReqRssiMin \| scnReqRtdMax \| hoReqCinrMaxNbs \| hoReqRssiMaxNbs \| hoReqCinrMargin \| hoReqRssiMargin \| hoReqRtdMax \| hoReqCinrMinSbs \| hoReqRssiMinSbs} ] |

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display a specific Trigger in a specific Neighbour BS of a specific BS. Do not specify a value for this parameter if you want to display the Triggers of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |
| bs-id-lsb <(1 to 16777215 StepSize 1)> | The Neighbour BS ID.<br>Specify a value for this parameter if you want to display a specific Trigger in a specific Neighbour BS of a specific BS. Do not specify a value for this parameter if you want to display the Triggers of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |

| | | | | | |
|---|---|---|---|---|---|
| | TrigName {scnReqCinrMin \| scnReqRssiMin \| scnReqRtdMax \| hoReqCinrMaxNbs \| hoReqRssiMaxNbs \| hoReqCinrMargin \| hoReqRssiMargin \| hoReqRtdMax \| hoReqCinrMinSbs \| hoReqRssiMinSbs} ] | The Trigger name<br>Specify only if you want to display a specific Trigger of a specific Neighbour BS in a specific BS. Do not specify if you want to display all Triggers parameters of all Neighbour BSs in all BSs | | | ■ scnReqCinrMin<br>■ scnReqRssiMin<br>■ scnReqRtdMax<br>■ hoReqCinrMaxNbs<br>■ hoReqRssiMaxNbs<br>■ hoReqCinrMargin<br>■ hoReqRssiMargin<br>■ hoReqRtdMax<br>■ hoReqCinrMinSbs<br>■ hoReqRssiMinSbs} |

**Display Format**

(for a selected Trigger)

```
BSIDLSB                    :<value>
BSIDLSB                    :value>
scnReqCinrMin              :value>
```

**Command Modes**

Global command mode

### 4.7.14.6.5 Displaying Configuration Information for All Neighbour BS Parameters

To display configuration for the all Neighbour BS parameters, run the following command:

**npu# show nbr-all bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> ]

Specify the BS ID and the Neighbour BS ID (bs-id-lsb) if you want to display configuration for a particular Neighbour BS in a particular BS. For example, to display all parameters of Neighbour BS 68000 in BS 66503, run the following command:

**npu# show nbr-all bs 66053 bs-id-lsb 68000**

Do not specify these parameters if you want to view configuration information for all existing Neighbour BSs in all existing BSs. To display information for all Neighbour BSs in all BSs, run the following command:

**npu# show nbr-all bs**

**Command Syntax**

**npu# show nbr-all bs** [<(1 to 16777215 StepSize 1)> bs-id-lsb <(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Trigger Setup parameters of a specific Neighbour BS in a specific BS. Do not specify a value for this parameter if you want to display the Trigger Setup parameters of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |
| bs-id-lsb <(1 to 16777215 StepSize 1)> | The Neighbour BS ID.<br><br>Specify a value for this parameter if you want to display the Trigger Setup parameters of a specific Neighbour BS in a specific BS. Do not specify a value for this parameter if you want to display the Trigger Setup parameters of all Neighbour BSs in all BSs. | Optional | N/A | 1-16777215 |

**Command Modes**

Global command mode

## 4.7.15 Managing UCD Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the UCD parameters (refer to Section 4.7.15.1).
- Restore the default values of some or all of the UCD parameters (refer to Section 4.7.15.2).

You can display configuration and status information for the UCD parameters of a selected or all existing BSs (refer to Section 4.7.15.3).

### 4.7.15.1 Configuring UCD Parameters

**To configure the UCD Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# ucd** [interval <(1 to 10000 StepSize 1)> ] [transition <(20 to 1000 StepSize 1)> ]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# ucd** `[interval <(1 to 10000 StepSize 1)> ] [transition <(20 to 1000 StepSize 1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [interval <(1 to 10000 StepSize 1)> ] | The time in milliseconds between transmission of Uplink Channel Descriptor messages. | Optional | 1000 | 1 - 10000 |

| | | | | | |
|---|---|---|---|---|---|
| | [transition <(20 to 1000 StepSize 1)> ] | The number of frames from the end of the frame carrying the Uplink Channel Descriptor message that the BS should wait after repeating an Uplink Channel Descriptor message with an increment of the configuration change count before issuing a UL-MAP message referring to Uplink_Burst_Profiles | Optional | 100 | 20 - 1000 |

**Command Modes** bs configuration mode

**IMPORTANT**

When creating a new BS, at least one of the UCD parameters must be configured explicitly (even if configured to the default value).

### 4.7.15.2 Restoring the Default Values of UCD Parameters

To restore the default values of some or all of the UCD parameters, run the following command:

**npu(config-bs-66053)# no ucd** [interval ] [transition ]

You can restore only one parameter to the default values by specifying only that parameters. For example, to restore only the interval parameter to the default value, run the following command:

**npu(config-bs-66053)# no ucd interval**

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all UCD parameters to their default value, run the following command:

**npu(config-bs-66053)# no ucd**

**NOTE**

Refer to Section 4.7.15.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no ucd** [interval ] [transition ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.15.3 Displaying Configuration and Status Information for UCD Parameters

To display configuration and status information of UCD parameters, run the following command:

**npu# show ucd bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the UCD parameters of BS 66053, run the following command:

**npu# show ucd bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ucd bs**

| | |
|---|---|
| **Command Syntax** | **npu# show ucd bs** [<(1 to 16777215 StepSize 1) |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display UCD parameters of a specific BS. Do not specify a value for this parameter if you want to display UCD parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
UCDConfigurationChangeCount              :<value>
UCDInterval(msec)                        :<value>
UCDTransition(frames)                    :<value>
```

**Command Modes**

Global command mode

In addition to the configurable parameters, the following status parameter is also displayed:

| Parameter | Description | Possible Values |
|---|---|---|
| UCDConfigurationChangeCount | Incremented by one (modulo 256) by the BS whenever any of the values of the Uplink Channel Descriptor changes. | 0-255 |

## 4.7.16 Managing DCD Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the DCD parameters (refer to Section 4.7.16.1).
- Restore the default values of some or all of the DCD parameters (refer to Section 4.7.16.2).

You can display configuration and status information for the DCD parameters of a selected or all existing BSs (refer to Section 4.7.16.3).

### 4.7.16.1 Configuring DCD Parameters

**To configure the DCD Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# dcd** [interval <(1 to 10000 StepSize 1)> ] [transition <(20 to 1000 StepSize 1)> ]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# dcd** `[interval <(1 to 10000 StepSize 1)> ] [transition <(20 to 1000 StepSize 1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [interval <(1 to 10000 StepSize 1)> ] | The time in milliseconds between transmission of Downlink Channel Descriptor messages. | Optional | 1000 | 1 - 10000 |
| [transition <(20 to 1000 StepSize 1)> ] | The number of frames from the end of the frame carrying the Downlink Channel Descriptor message that the BS should wait after repeating a Downlink Channel Descriptor message with an increment of the configuration change count before issuing a DL-MAP message referring to Downlink_Burst_Profiles | Optional | 100 | 20 - 1000 |

| | |
|---|---|
| **Command Modes** | bs configuration mode |

**IMPORTANT**

When creating a new BS, at least one of the DCD parameters must be configured explicitly (even if configured to the default value).

### 4.7.16.2 Restoring the Default Values of DCD Parameters

To restore the default values of some or all of the DCD parameters, run the following command:

**npu(config-bs-66053)# no dcd** [interval ] [transition ]

You can restore only one parameter to the default values by specifying only that parameter. For example, to restore only the interval parameter to the default value, run the following command:

**npu(config-bs-66053)# no dcd interval**

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all DCD parameters to their default value, run the following command:

**npu(config-bs-66053)# no dcd**

**NOTE**

Refer to Section 4.7.16.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no dcd** `[interval ] [transition ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.16.3 Displaying Configuration and Status Information for DCD Parameters

To display configuration and status information of DCD parameters, run the following command:

**npu# show dcd bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the DCD parameters of BS 66053, run the following command:

**npu# show dcd bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show dcd bs**

**Command Syntax**

**npu# show dcd bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display DCD parameters of a specific BS. Do not specify a value for this parameter if you want to display DCD parameters of all BSs. | Optional | N/A | 1-16777215 |

| | | |
|---|---|---|
| **Display Format** (for each existing BS if requested for all BSs) | `BSIDLSB` | `:<value>` |
| | `DCDConfigurationChangeCount` | `:<value>` |
| | `RestartCount` | `:<value>` |
| | `DCDInterval(msec)` | `:<value>` |
| | `DCDTransition(frames)` | `:<value>` |

**Command Modes** Global command mode

In addition to the configurable parameters, the following status parameters are also displayed:

| Parameter | Description | Possible Values |
|---|---|---|
| DCDConfigurationChangeCount | Incremented by one (modulo 256) by the BS whenever any of the values of the Downlink Channel Descriptor changes. | 0-255 |
| RestartCount | Iincremented by one (modulo 256) whenever BS restarts. The value is needed to populate neighbouring BSs neighbour tables. | 0-255 |

## 4.7.17 Managing the RF Frequency Parameter

After enabling the BS configuration mode, you can configure the RF frequency parameter (refer to Section 4.7.17.1).

You can display configuration information for the RF frequency parameter of a selected or all existing BSs (refer to Section 4.7.17.2).

### 4.7.17.1 Configuring the RF Frequency Parameter

**To configure the RF frequency parameter:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# rf** [frequency <(2302.5 to 2357.5 StepSize 0.125) | (2498.5 to 2687.5 StepSize0.125) | (3402.5 to 3597.5 StepSize 0.125) | (3602.5 to 3797.5 StepSize 0.125)>]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)#** `rf [frequency <(2302.5 to 2357.5 StepSize 0.125) \| (2498.5 to 2687.5 StepSize0.125) \| (3402.5 to 3597.5 StepSize 0.125) \| (3602.5 to 3797.5 StepSize 0.125)>]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [frequency <(2302.5 to 2357.5 StepSize 0.125) \| (2498.5 to 2687.5 StepSize0.125) \| (3402.5 to 3597.5 StepSize 0.125) \| (3602.5 to 3797.5 StepSize 0.125)>] | The center of the frequency band in which the BS will transmit, in MHz.<br><br>Must be within the valid range of the relevant ODU.<br><br>The indicated Possible Values are for a bandwidth of fiveMhz. For a different bandwidth, the actually valid values are from f1+1/2BW to f2-1/2BW, where f1 is the lowest frequency of the ODU's radio band (see "Currently Available Single Port ODU Types" on page 466. Note that oDU23052360000N361by1Y0 (16) includes two bands: 2305-2320, 2345-2360 MHz.), f2 is the highest frequency of the ODU's band, and BW is the configured bandwidth (see "Configuring the Baseband Bandwidth Parameter" on page 619). | Mandatory | N/A | ■ 2302.5 to 2357.5 in steps of 0.125<br><br>■ 2498.5 to 2687.5 in steps of 0.125<br><br>■ 3402.5 to 3597.5 in steps of 0.125<br><br>■ 3602.5 to 3797.5 in steps of 0.125 |

| | |
|---|---|
| **Command Modes** | bs configuration mode |

**IMPORTANT**

When creating a new BS, the mandatory frequency parameter must be configured.

### 4.7.17.2 Displaying Configuration Information for the RF Frequency Parameter

To display configuration information of the RF frequency parameter, run the following command:

**npu# show rf bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the RF frequency of BS 66053, run the following command:

**npu# show rf bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show rf bs**

**Command Syntax**

**npu# show rf bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the RF frequency parameter of a specific BS. Do not specify a value for this parameter if you want to display the RF frequency parameter of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                    :<value>
Frequency                                  :<value>
```

| | |
|---|---|
| **Command Modes** | Global command mode |

## 4.7.18 Managing the Baseband Bandwidth Parameter

After enabling the BS configuration mode, you can configure the Baseband bandwidth parameter (refer to Section 4.7.18.1).

You can display configuration information for the Baseband bandwidth parameter of a selected or all existing BSs (refer to Section 4.7.18.2).

### 4.7.18.1 Configuring the Baseband Bandwidth Parameter

**To configure the Baseband bandwidth parameter:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# baseband** [bandwidth {fiveMHz | tenMHz | sevenMHz} ]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# baseband** `[bandwidth {fiveMHz \| tenMHz \| sevenMHz} ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [bandwidth {fiveMHz \| tenMHz \| sevenMHz} ] | BS channel bandwidth | Mandatory | N/A | ■ fiveMHz<br>■ tenMHz<br>■ sevenMHz (not applicable for current release) |

| | |
|---|---|
| **Command Modes** | bs configuration mode |

**IMPORTANT**

When creating a new BS, the mandatory frequency parameter must be configured.

Note that the valid value ranges (and in some cases also default value) of certain parameters are affected by the value configured for the bandwidth parameter. If you change the bandwidth, verify that these parameters are configured properly:

| Table | Parameters |
|---|---|
| RF (see Section 4.7.17.1) | frequency |
| Airframe Structure, General (see Section 4.7.19.2.1) | ul-dl-allocation |
| Airframe Structure, Map Zone (see Section 4.7.19.2.2) | majorgrps |
| Airframe Structure, Uplink Feedback Zone (see Section 4.7.19.2.8) | subchannels |
| Airframe Structure, Downlink Data Zone (see Section 4.7.19.2.9) | subchannels |
| Airframe Structure, Uplink Data Zone (see Section 4.7.19.2.10) | subchannels<br>subchannels-number |
| Feedback Allocation (see Section 4.7.7.1) | max-cqi |
| Triggers (see Section 4.7.9.1) | triggers-scnreq-rtd-max<br>triggers-horeq-rtd-max |

### 4.7.18.2 Displaying Configuration Information for the Baseband Bandwidth Parameter

To display configuration information of the Baseband bandwidth parameter, run the following command:

**npu# show baseband bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Baseband bandwidth of BS 66053, run the following command:

**npu# show baseband bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show baseband bs**

**Command Syntax**

**npu# show baseband bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Baseband bandwidth parameter of a specific BS. Do not specify a value for this parameter if you want to display the Baseband bandwidth parameter of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                    :<value>
Bandwidth                                  :<value>
```

**Command Modes**

Global command mode

## 4.7.19 Managing Airframe Structure Parameters

**To configure Airframe Structure parameters:**

1. Enable the Airframe configuration mode (refer to Section 4.7.19.1)
2. You can now execute any of the following tasks:

- Configure one or more of the Airframe parameters tables (refer to Section 4.7.19.2)
- Restore the default values of parameters in one or more of the Airframe parameters tables (refer to Section 4.7.19.3)
- Terminate the Airframe configuration mode (refer to Section 4.7.19.4)

In addition, you can, at any time, display configuration information for each of the Airframe parameters tables (refer to Section 4.7.19.5).

### 4.7.19.1 Enabling the Airframe Configuration Mode

To configure the Airframe parameters, first enable the Airframe configuration mode. Run the following command to enable the Airframe configuration mode.

```
npu(config-bs-66053)# airframe
```

After enabling the Airframe configuration mode, you can execute any of the following tasks:

- Configure one or more of the Airframe parameters tables (refer to Section 4.7.19.2)
- Restore the default values of parameters in one or more of the Airframe parameters tables (refer to Section 4.7.19.3)

After executing the above tasks, you can terminate the Airframe configuration mode (refer to Section 4.7.19.4) and return to the BS configuration mode.

Note that for properly completing the Airframe configuration the **apply** command must be executed prior to exiting the Airframe configuration mode.

| | |
|---|---|
| **Command Syntax** | `npu(config-bs-66053)# airframe` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.19.2 Configuring Airframe Parameters

After enabling the Airframe configuration mode you can configure the following parameters tables:

- General (refer to Section 4.7.19.2.1)
- Map Zone (refer to Section 4.7.19.2.2)
- Downlink Diversity (refer to Section 4.7.19.2.3)
- Cyclic Delay (refer to Section 4.7.19.2.4)
- Linear Delay (refer to Section 4.7.19.2.5)
- Mapping (refer to Section 4.7.19.2.6)
- Receive (refer to Section 4.7.19.2.7)
- Uplink Feedback Zone (refer to Section 4.7.19.2.8)
- Downlink Data Zone (refer to Section 4.7.19.2.9)
- Uplink Data Zone (refer to Section 4.7.19.2.10)
- Dynamic Permutation (refer to Section 4.7.19.2.11)

**IMPORTANT**

After completing the Airframe configuration,do not forget to execute the apply command before exiting the Airframe configuration mode:

**npu(config-bs-66053-airframe)# apply**

#### 4.7.19.2.1 Configuring Airframe General Parameters

To configure the Airframe General parameters, run the following command:

**npu(config-bs-66053-airframe)# general** [cell-id <(0 to 31 StepSize 1)> ] [preamble-grp <(1 to 2 StepSize 1)>] [segment <(0 to 2 StepSize 1)> ] [frame-offset <(0 to 15 StepSize 1)> ] [enable-ul-scrotation {TRUE | FALSE} ] [ul-dl-allocation <(3 to 7 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, all mandatory Neighbor BS General parameters must be configured.

**Command Syntax**

```
npu(config-bs-66053-airframe)# general [cell-id <(0 to 31 StepSize 1)> ] [preamble-grp <(1 to 2 StepSize 1)>] [segment <(0 to 2 StepSize 1)> ] [frame-offset <(0 to 15 StepSize 1)> ] [enable-ul-scrotation {TRUE | FALSE} ] [ul-dl-allocation <(3 to 7 StepSize 1)> ]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [cell-id <(0 to 31 StepSize 1)> ] | The Cell ID (IDCell) used for preamble selection. | Mandatory when creating a new BS. | N/A | 0 - 31 |
| [preamble-grp <(1 to 2 StepSize 1)>] | The preamble group. For some sets of cell-id (see above) and segment number (see below) ) one of two different preambles can be selected. In this case this parameter selects the preamble to use | Optional | 1 | 1 - 2 |
| [segment <(0 to 2 StepSize 1)> ] | The segment (BS) number in a three sector BS (0-2). This number influences the preamble selection and the major group used for the FDC transmission. | Mandatory when creating a new BS. | N/A | 0 - 2 |

| | | | | | |
|---|---|---|---|---|---|
| | [frame-offset <(0 to 15 StepSize 1)> ] | Controls the offset applied between the internal frame count and the reported frame number | Mandatory when creating a new BS. | N/A | 0 - 15 |
| | [enable-ul-scrotation {TRUE \| FALSE} ] | Controls the uplink sub channel rotation functionality.<br>If TRUE uplink sub channel rotation is enabled. | Optional | FALSE | ■ TRUE<br>■ FALSE |
| | [ul-dl-allocation <(3 to 7 StepSize 1)> ] | The total duration of the uplink in a frame, in slots. (one slot equals 3 symbols).<br>The range is 4-7 for bandwidth = 5 or 10MHz, 3-5 for bandwidth = 7MHz (not supported in current release).<br>To avoid BS-BS interference, the ul-dl-allocation must be identical in all BSs in a geographical region.<br>For bandwidth of 5 or 10 MHz, the uplink-downlink allocation proprtions (in symbols) for the different values are:<br>4: 12-34<br>5: 15-31<br>6: 18-28<br>7: 21-25 | Mandatory when creating a new BS. | N/A | 3 - 7 |

**Command Modes** bs airframe configuration mode

### 4.7.19.2.2 Configuring Airframe Map Zone Parameters

To configure the Airframe Map Zone parameters, run the following command:

**npu(config-bs-66053-airframe)# mapzone** [size <(-1 to -1 StepSize 1) | (2 to 16 StepSize 2)> ] [majorgrps <hex-string>] [repetition <(1 to 1 StepSize 1) | (2 to 6 StepSize 2)> ]

**IMPORTANT**

When creating a new BS, the mandatory Airframe Map Zone majorgrps parameter must be configured.

**Command Syntax**

**npu(config-bs-66053-airframe)# mapzone** `[size <(-1 to -1 StepSize 1) | (2 to 16 StepSize 2)> ] [majorgrps <hex-string>] [repetition <(1 to 1 StepSize 1) | (2 to 6 StepSize 2)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| size <(-1 to -1 StepSize 1) \| (2 to 16 StepSize 2)> | The map zone size in symbols. A value of "-1" means the map zone size will be dynamic. | Optional | 6 | -1, 2, 4, 6, 8, 10, 12, 14, 16. |

| | | | | | |
|---|---|---|---|---|---|
| | majorgrps <hex-string> | The Major groups allocated to the BS for maps transmission.<br><br>Two hexadecimal numbers representing 8 bits numbered 0 to 7 (left to right). Bits 0 to 5 indicate whether Subchannel Groups 0 to 5 (respectively) are allocated. Bit 6 and 7 are set to 0.<br><br>If BW=5 MHz, bits 1, 3 and 5 are not relevant ("don't care").<br><br>If segment (see Section 4.7.19.2.1) = 0, then bit #0 should be set.<br>If segment = 1, then bit #2 should be set.<br>If segment = 2, then bit #4 should be set. | Mandatory when creating a new BS. | N/A | a string of two hexadecimal nubers. |
| | repetition <(1 to 1 StepSize 1) \| (2 to 6 StepSize 2)> | The basic repetition used in the transmission of the maps | Optional | 6 | 1, 2, 4, 6 |

**Command Modes** bs airframe configuration mode

### 4.7.19.2.3 Configuring the Airframe Downlink Diversity Mode Parameter

To configure the Airframe Downlink Diversity mode parameter, run the following command:

**npu(config-bs-66053-airframe)# dldiversity** [mode <{none | matrixA ]> ]

**IMPORTANT**

When creating a new BS, the Airframe Downlink Diversity mode parameter must be configured (even if configured to the default value).

**Command Syntax** **npu(config-bs-66053-airframe)# dldiveraity** [mode <{none | matrixA ]>]

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| mode <{none \| matrixA ]> | The diversity mode used in downlink transmissions: None or MIMO Matrix A.<br><br>Note that the value configured for the dldiversity mode affects the valid options for Cyclic Delay (see Section 4.7.19.2.4), Linear Delay (see Section 4.7.19.2.5) and Mapping (see Section 4.7.19.2.6) parameters. | Optional | none | ■ none<br>■ matrixA |

**Command Modes** bs airframe configuration mode

### 4.7.19.2.4 Configuring Airframe Cyclic Delay Parameters

To configure the Airframe Cyclic Delay parameters, run the following command:

**npu(config-bs-66053-airframe)# cyclicdelay** [channel-1 <(0 to 4 StepSize 0.01)> ] [channel-2 <(0 to 4 StepSize 0.01)> ] [channel-3 <(0 to 4 StepSize 0.01)> ] [channel-4 <(0 to 4 StepSize 0.01)> ]

**IMPORTANT**

When creating a new BS, at least one of the Airframe Cyclic Delay parameters must be configured explicitly (even if configured to the default value). configured.

**Command Syntax** **npu(config-bs-66053-airframe)# cyclicdelay** `[channel-1 <(0 to 4 StepSize 0.01)> ] [channel-2 <(0 to 4 StepSize 0.01)> ] [channel-3 <(0 to 4 StepSize 0.01)> ] [channel-4 <(0 to 4 StepSize 0.01)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [channel-1 <(0 to 4 StepSize 0.01)> ] | Controls the cyclic delay (in microseconds) applied to PHY physical channel #1.<br><br>Not relevant if dldiversity mode (see Section 4.7.19.2.3 is “none”) | Optional | 0 | 0 to 4 in steps of 0.01 |
| [channel-2 <(0 to 4 StepSize 0.01)> ] | Controls the cyclic delay (in microseconds) applied to PHY physical channel #2.<br><br>Not relevant if dldiversity mode (see Section 4.7.19.2.3 is “none”) | Optional | 0 | 0 to 4 in steps of 0.01 |
| [channel-3 <(0 to 4 StepSize 0.01)> ] | Controls the cyclic delay (in microseconds) applied to PHY physical channel #3.<br><br>Not relevant if dldiversity mode (see Section 4.7.19.2.3 is “none”) | Optional | 0 | 0 to 4 in steps of 0.01 |
| [channel-4 <(0 to 4 StepSize 0.01)> ] | Controls the cyclic delay (in microseconds) applied to PHY physical channel #4.<br><br>Not relevant if dldiversity mode (see Section 4.7.19.2.3 is “none”) | Optional | 0 | 0 to 4 in steps of 0.01 |

**Command Modes**

bs airframe configuration mode

### 4.7.19.2.5 Configuring Airframe Linear Delay Parameters

To configure the Airframe Linear Delay parameters, run the following command:

**npu(config-bs-66053-airframe)# lineardelay** [channel-1 <(0 to 4 StepSize 0.01)> ] [channel-2 <(0 to 4 StepSize 0.01)> ] [channel-3 <(0 to 4 StepSize 0.01)> ] [channel-4 <(0 to 4 StepSize 0.01)> ]

**IMPORTANT**

When creating a new BS, at least one of the Airframe Linear Delay parameters must be configured explicitly (even if configured to the default value). configured.

**Command Syntax**

**npu(config-bs-66053-airframe)# lineardelay** `[channel-1 <(0 to 4 StepSize 0.01)> ] [channel-2 <(0 to 4 StepSize 0.01)> ] [channel-3 <(0 to 4 StepSize 0.01)> ] [channel-4 <(0 to 4 StepSize 0.01)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [channel-1 <(0 to 4 StepSize 0.01)> ] | Controls the linear delay (in microseconds) applied to PHY physical channel #1.<br>Not relevant if dldiversity mode (see Section 4.7.19.2.3 is “none”) | Optional | 0 | 0 to 4 in steps of 0.01 |
| [channel-2 <(0 to 4 StepSize 0.01)> ] | Controls the linear delay (in microseconds) applied to PHY physical channel #2.<br>Not relevant if dldiversity mode (see Section 4.7.19.2.3 is “none”) | Optional | 0 | 0 to 4 in steps of 0.01 |
| [channel-3 <(0 to 4 StepSize 0.01)> ] | Controls the linear delay (in microseconds) applied to PHY physical channel #3.<br>Not relevant if dldiversity mode (see Section 4.7.19.2.3 is “none”) | Optional | 0 | 0 to 4 in steps of 0.01 |
| [channel-4 <(0 to 4 StepSize 0.01)> ] | Controls the linear delay (in microseconds) applied to PHY physical channel #4.<br>Not relevant if dldiversity mode (see Section 4.7.19.2.3 is “none”) | Optional | 0 | 0 to 4 in steps of 0.01 |

| | |
|---|---|
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.2.6 Configuring Airframe Mapping Parameters

To configure the Airframe Mapping parameters, run the following command:

**npu(config-bs-66053-airframe)# mapping** [channel-1 {l1 | l1slashL2 | Silence} ] [channel-2 {l1 | l1slashL2 | Silence} ] [channel-3 {l1 | l1slashL2 | Silence} ] [channel-4 {l1 | l1slashL2 | Silence} ]

**IMPORTANT**

When creating a new BS, at least one of the Airframe Mapping parameters must be configured explicitly (even if configured to the default value). configured.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# mapping** `[channel-1 {l1 \| l1slashL2 \| Silence} ] [channel-2 {l1 \| l1slashL2 \| Silence} ] [channel-3 {l1 \| l1slashL2 \| Silence} ] [channel-4 {l1 \| l1slashL2 \| Silence} ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [channel-1 {l1 \| l1slashL2 \| Silence} ] | Defines which logical stream is mapped to physical channel #1:<br>l1: Logical Stream 1.<br>l1slashL2: Logical Streams 1 and 2.<br>Silence: None<br><br>If the ODU port associated to port 1 of the AU associated to this BS is "rx only" (port-2 or port-4), the only valid value is Silence.<br><br>If dldiversity mode (see Section 4.7.19.2.3 is “none”), valid options are l1 and Silence. | Optional | l1 | ■ l1<br>■ l1slashL2<br>■ Silence |

| | | | | | |
|---|---|---|---|---|---|
| | [channel-2 {l1 \| l1slashL2 \| Silence} ] | Defines which logical stream is mapped to physical channel #2.<br>l1: Logical Stream 1.<br>l1slashL2: Logical Streams 1 and 2.<br>Silence: None<br><br>If the ODU port associated to port 2 of the AU associated to this BS is "rx only" (port-2 or port-4), the only valid value is Silence.<br><br>If dldiversity mode (see Section 4.7.19.2.3 is “none”), valid options are l1 and Silence. | Optional | l1 | ■ l1<br>■ l1slashL2<br>■ Silence |
| | [channel-3 {l1 \| l1slashL2 \| Silence} ] | Defines which logical stream is mapped to physical channel #3.<br>l1: Logical Stream 1.<br>l1slashL2: Logical Streams 1 and 2.<br>Silence: None<br><br>If the ODU port associated to port 3 of the AU associated to this BS is "rx only" (port-2 or port-4), the only valid value is Silence.<br><br>If dldiversity mode (see Section 4.7.19.2.3 is “none”), valid options are l1 and Silence. | Optional | l1 | ■ l1<br>■ l1slashL2<br>■ Silence |

| | | | | | |
|---|---|---|---|---|---|
| | [channel-4 {l1 \| l1slashL2 \| Silence} ] | Defines which logical stream is mapped to physical channel #4.<br>l1: Logical Stream 1.<br>l1slashL2: Logical Streams 1 and 2.<br>Silence: None<br><br>If the ODU port associated to port 4 of the AU associated to this BS is "rx only" (port-2 or port-4), the only valid value is Silence.<br><br>If dldiversity mode (see Section 4.7.19.2.3 is "none"), valid options are l1 and Silence. | Optional | l1 | ■ l1<br>■ l1slashL2<br>■ Silence |

| | |
|---|---|
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.2.7 Configuring Airframe Receive Parameters

To configure the Airframe Receive parameters, run the following command:

**npu(config-bs-66053-airframe)# rx** [adminchannel-1 {TRUE | FALSE} ] [adminchannel-2 {TRUE | FALSE} ] [adminchannel-3 {TRUE | FALSE} ] [adminchannel-4 {TRUE | FALSE} ]

**IMPORTANT**

When creating a new BS, at least one of the Airframe Receive parameters must be configured explicitly (even if configured to the default value). configured.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# rx** `[adminchannel-1 {TRUE \| FALSE} ] [adminchannel-2 {TRUE \| FALSE} ] [adminchannel-3 {TRUE \| FALSE} ] [adminchannel-4 {TRUE \| FALSE} ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [adminchannel-1 {TRUE \| FALSE} ] | The desired status of channel 1 in the modem receiver. A value of TRUE means enabled. | Optional | TRUE | ■ TRUE<br>■ FALSE |
| [adminchannel-2 {TRUE \| FALSE} ] | The desired status of channel 2 in the modem receiver. A value of TRUE means enabled. | Optional | FALSE | ■ TRUE<br>■ FALSE |
| [adminchannel-3 {TRUE \| FALSE} ] | The desired status of channel 3 in the modem receiver. A value of TRUE means enabled. | Optional | FALSE | ■ TRUE<br>■ FALSE |
| [adminchannel-4 {TRUE \| FALSE} ] | The desired status of channel 4 in the modem receiver. A value of TRUE means enabled. | Optional | FALSE | ■ TRUE<br>■ FALSE |

**Command Modes**

bs airframe configuration mode

### 4.7.19.2.8 Configuring Airframe Uplink Feedback Zone Parameters

To configure the Airframe Uplink Feedback Zone parameters, run the following command:

**npu(config-bs-66053-airframe)# ulfeedbackzone** [subchannels <(1 to 35 StepSize 1)> ] [permbase <(0 to 69 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, the Airframe Structure Uplink Feedback Zone mandatory permbase parameter must be configured.

**Command Syntax**

**npu(config-bs-66053-airframe)#** `ulfeedbackzone [subchannels <(1 to 35 StepSize 1)> ] [permbase <(0 to 69 StepSize 1)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [subchannels <(1 to 35 StepSize 1)> ] | The number of subchannels used in the uplink feedback zone.<br>If bandwidth=7MHz or 10MHz, valid range is 1-35. If bandwidth=5MHz, valid range is 1-17. The default for bandwidth=5MHz should be 17.<br>Must be higher then or equal to the value of max-cqi (see Section 4.7.7.1) | Optional | 35 | 1-35 |
| [permbase <(0 to 69 StepSize 1)> ] | The permutation base used in the feedback zone | Mandatory when creating a new BS. | N/A | 0 - 69 |

**Command Modes**

bs airframe configuration mode

### 4.7.19.2.9 Configuring Airframe Downlink Data Zone Parameters

To configure the Airframe Downlink Data Zone parameters, run the following command:

**npu(config-bs-66053-airframe)# dldatazone** [subchannels <(1 to 30 StepSize 1)>] [permbase <(0 to 31 StepSize 1)>]

**IMPORTANT**

When creating a new BS, the Airframe Uplink Feedback Zone mandatory parameters must be configured.

**Command Syntax**

**npu(config-bs-66053-airframe)# dldatazone** `[subchannels <(1 to 30 StepSize 1)> ] [permbase <(0 to 31 StepSize 1)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [subchannels <(1 to 30 StepSize 1)> ] | The number of subchannels used in thedownlink data zone.<br>If bandwidth=7MHz or 10MHz, valid range is 1-30. If bandwidth=5MHz, valid range is 1-15. | Mandatory when creating a new BS. | N/A | 1-30 |
| [permbase <(0 to 31 StepSize 1)> ] | The permutation base used in the downlink data zone | Mandatory when creating a new BS. | N/A | 0 - 31 |

**Command Modes**

bs airframe configuration mode

### 4.7.19.2.10 Configuring Airframe Uplink Data Zone Parameters

To configure the Airframe Uplink Data Zone parameters, run the following command:

**npu(config-bs-66053-airframe)# uldatazone** [permbase <(0 to 69 StepSize 1)>] [startallocation <(0 to 209 StepSize 1)>] [subchannels-number <(1 to 35 StepSize 1)>]

**IMPORTANT**

When creating a new BS, the Airframe Structure Uplink Data Zone mandatory permbase parameter must be configured.

**Command Syntax**

**npu(config-bs-66053-airframe)# uldatazone** `[permbase <(0 to 69 StepSize 1)> ] [startallocation <(0 to 209 StepSize 1)> ] [subchannels-number <(1 to 35 StepSize 1)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [permbase <(0 to 69 StepSize 1)> ] | The permutation base used in the uplink datazone | Optional | | 0 to 69 in steps of 1 |
| [startallocation <(0 to 209 StepSize 1)> ] | The start allocation for the uplink datazone in slots | Optional | 0 | 0 to 209 in steps of 1 |
| [subchannels-number <(1 to 35 StepSize 1)> ] | The number of subchannels used in the uplink datazone | Optional | 35<br>default value=35 (7 , 10 MHz) or 17 (5MHz) | 1- 35 |

**Command Modes**

bs airframe configuration mode

### 4.7.19.2.11 Configuring Airframe Dynamic Permutation Parameters

To configure the Airframe Dynamic Permutation parameters, run the following command:

**npu(config-bs-66053-airframe)# dynamicperm** [dl-permbase {TRUE | FALSE} ] [ul-permbase {TRUE | FALSE} ] ]

**IMPORTANT**

When creating a new BS, the Airframe Dynamic Permutation mandatory permbase parameter must be configured.

**Command Syntax**

**npu(config-bs-66053-airframe)# dynamicperm** `[dl-permbase {TRUE | FALSE} ] [ul-permbase {TRUE | FALSE} ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | `dl-permbase {TRUE \| FALSE}` | The Downlink Permutation Base. If TRUE we use the same Permutation Base over all frames (Static). If FALSE the Permutation Base changes from frame to frame (Dynamic). | Optional | True | ■ TRUE<br>■ FALSE |
| | `ul-permbase {TRUE \| FALSE}` | The Uplink Permutation Base. If TRUE we use the same Permutation Base over all frames. If FALSE the Permutation Base changes from frame to frame. | Optional | True | ■ TRUE<br>■ FALSE |

**Command Modes** bs airframe configuration mode

### 4.7.19.3 Restoring Default Values for Airframe Configuration Parameters

After enabling the Airframe configuration mode you can restore the default values for non-mandatory parameters in the following parameters tables:

- General (refer to Section 4.7.19.3.1)
- Map Zone (refer to Section 4.7.19.3.2)
- Downlink Diversity (refer to Section 4.7.19.3.3)
- Cyclic Delay (refer to Section 4.7.19.3.4)
- Linear Delay (refer to Section 4.7.19.3.5)
- Mapping (refer to Section 4.7.19.3.6)
- Receive (refer to Section 4.7.19.3.7)
- Uplink Feedback Zone (refer to Section 4.7.19.3.8)
- Uplink Data Zone (refer to Section 4.7.19.3.9)
- Dynamic Permutation (refer to Section 4.7.19.3.10)

#### 4.7.19.3.1 Restoring the Default Values of Airframe General Parameters

To restore one or all of the Airframe non-mandatory General parameters to their default values, run the following command:

**npu(config-bs-66053-airframe)# no general** [preamble-grp ] [enable-ul-scrotation ]

You can restore only one parameter to the default value by specifying only that parameter. For example, to restore only the preamble-grp to the default value, run the following command:

**npu(config-bs-66053-airframe)# no general preamble-grp**

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all non-mandatory parameters to their default value, run the following command:

**npu(config-bs-66053-airframe)# no general**

**NOTE**

Refer to Section 4.7.19.2.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no general** `[preamble-grp ] [enable-ul-scrotation ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

#### 4.7.19.3.2 Restoring the Default Values of Airframe Map Zone Parameters

To restore one or all of the Airframe Map Zone non-mandatory parameters to their default values, run the following command:

**npu(config-bs-66053-airframe)# no mapzone** [size ] [repetition ]

You can restore only one parameter to the default value by specifying only that parameter. For example, to restore only the size parameter to the default value, run the following command:

**npu(config-bs-66053-airframe)# no mapzone size**

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all non-mandatory parameters to their default value, run the following command:

**npu(config-bs-66053-airframe)# no mapzone**

**NOTE**

Refer to Section 4.7.19.2.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no mapzone** `[size ] [repetition ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.3.3 Restoring the Default Value of Airframe Downlink Diversity Mode Parameter

To restore the Airframe Downlink Diversity mode parameter to its default value, run the following command:

**npu(config-bs-66053-airframe)# no dldiversity mode**

Since the Downlink Diversity table contains a single parameter, it is sufficient to run the following command:

**npu(config-bs-66053-airframe)# no dldiversity**

**NOTE**

Refer to Section 4.7.19.2.3 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no dldiversity** `[mode ]` |

| | |
|---|---|
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.3.4 Restoring the Default Values of Airframe Cyclic Delay Parameters

To restore one or all of the Airframe Cyclic Delay parameters to their default values, run the following command:

**npu(config-bs-66053-airframe)# no cyclicdelay** [channel-1 ] [channel-2 ] [channel-3 ] [channel-4 ]

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the channel-1 and channel-2 parameters to the default value, run the following command:

**npu(config-bs-66053-airframe)# no cyclicdelay channel-1 channel-2**

These parameters will be restored to their default values, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

**npu(config-bs-66053-airframe)# no cyclicdelay**

**NOTE**

Refer to Section 4.7.19.2.4 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no cyclicdelay** `[channel-1 ] [channel-2 ] [channel-3 ] [channel-4 ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.3.5 Restoring the Default Values of Airframe Linear Delay Parameters

To restore one or all of the Airframe Linear Delay parameters to their default values, run the following command:

**npu(config-bs-66053-airframe)# no lineardelay** [channel-1 ] [channel-2 ] [channel-3 ] [channel-4 ]

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the channel-1 and channel-2 parameters to the default value, run the following command:

**npu(config-bs-66053-airframe)# no lineardelay channel-1 channel-2**

These parameters will be restored to their default values, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

**npu(config-bs-66053-airframe)# no lineardelay**

**NOTE**

Refer to Section 4.7.19.2.5 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no lineardelay** `[channel-1 ] [channel-2 ] [channel-3 ] [channel-4 ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.3.6 Restoring the Default Values of Airframe Mapping Parameters

To restore one or all of the Airframe Mapping parameters to their default values, run the following command:

**npu(config-bs-66053-airframe)# no mapping** [channel-1 ] [channel-2 ] [channel-3 ] [channel-4 ]

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the channel-1 and channel-2 parameters to the default value, run the following command:

**npu(config-bs-66053-airframe)# no mapping channel-1 channel-2**

These parameters will be restored to their default values, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

**npu(config-bs-66053-airframe)# no mapping**

**NOTE**

Refer to Section 4.7.19.2.6 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no mapping** `[channel-1 ] [channel-2 ] [channel-3 ] [channel-4 ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.3.7 Restoring the Default Values of Airframe Receive Parameters

To restore one or all of the Airframe Receive parameters to their default values, run the following command:

**npu(config-bs-66053-airframe)# no rx** [adminchannel-1 ] [adminchannel-2 ] [adminchannel-3 ] [adminchannel-4 ]

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the adminchannel-1 and adminchannel-2 parameters to the default value, run the following command:

**npu(config-bs-66053-airframe)# no rx adminchannel-1 adminchannel-2**

These parameters will be restored to their default values, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

**npu(config-bs-66053-airframe)# no rx**

**NOTE**

Refer to Section 4.7.19.2.7 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no rx** [adminchannel-1 ] [adminchannel-2 ] [adminchannel-3 ] [adminchannel-4 ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

#### 4.7.19.3.8 Restoring the Default Value of Airframe Uplink Feedback Zone Subchannels Parameter

To restore the Airframe Uplink Feedback Zone non-mandatory subchannels parameter to its default value, run the following command:

**npu(config-bs-66053-airframe)# no ulfeedbackzone subchannels**

Since the Downlink Diversity table contains a single non-mandatory parameter, it is sufficient to run the following command:

**npu(config-bs-66053-airframe)# no ulfeedbackzone**

**NOTE**

Refer to Section 4.7.19.2.8 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no ulfeedbackzone** [subchannels ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

#### 4.7.19.3.9 Restoring the Default Values of Airframe Uplink Data Zone Parameters

To restore one or all of the Airframe Uplink Data Zone parameters to their default values, run the following command:

**npu(config-bs-66053-airframe)# no uldatazone** [startallocation] [subchannels-number]

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the startallocation parameters to the default value, run the following command:

**npu(config-bs-66053-airframe)# no uldatazone startallocation**

This parameter will be restored to the default values, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

**npu(config-bs-66053-airframe)# no uldatazone**

**NOTE**

Refer to Section 4.7.19.2.10 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no uldatazone** `[startallocation ] [subchannels-number ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.3.10 Restoring the Default Values of Airframe Dynamic Permutation Parameters

To restore one or all of the Airframe Dynamic Permutation parameters to their default values, run the following command:

**npu(config-bs-66053-airframe)# no dynamicperm** [dl-permbase ] [ul-permbase ]

You can restore only one parameter to the default value by specifying only that parameter. For example, to restore only the dl-permbase to the default value, run the following command:

**npu(config-bs-66053-airframe)# no dynamicperm dl-permbase**

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all non-mandatory parameters to their default value, run the following command:

**npu(config-bs-66053-airframe)# no dynamicperm**

**NOTE**

Refer to Section 4.7.19.2.11 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# no dynamicperm** `[dl-permbase ] [ul-permbase ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.4 Terminating the Airframe Configuration Mode

Run the following command to terminate the Airframe configuration mode:

**npu(config-bs-66053-airframe)# exit**

**IMPORTANT**

Do not forget to execute the apply command before terminating the Airframe configuration mode:
**npu(config-bs-66053-airframe)# apply**

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-airframe)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | bs airframe configuration mode |

### 4.7.19.5 Displaying Configuration Information for Airframe Parameters

You can display the current configuration information for the following Airframe parameters tables:

- General (refer to Section 4.7.19.5.1)
- Map Zone (refer to Section 4.7.19.5.2)
- Downlink Diversity (refer to Section 4.7.19.5.3)
- Cyclic Delay (refer to Section 4.7.19.5.4)
- Linear Delay (refer to Section 4.7.19.5.5)
- Mapping (refer to Section 4.7.19.5.6)
- Receive (refer to Section 4.7.19.5.7)
- Uplink Feedback Zone (refer to Section 4.7.19.5.8)
- Downlink Data Zone (refer to Section 4.7.19.5.9)
- Uplink Data Zone (refer to Section 4.7.19.5.10)
- Dynamic Permutation (refer to Section 4.7.19.5.11)
- All (refer to Section 4.7.19.5.12)

### 4.7.19.5.1 Displaying Configuration Information for Airframe General Parameters

To display configuration for the Airframe General parameters, run the following command:

**npu# show airframe-general bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe General parameters of BS 66503, run the following command:

**npu# show airframe-general bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-general bs**

| | |
|---|---|
| **Command Syntax** | **npu# show airframe-general bs** [<(1 to 16777215 StepSize 1)> ] |

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Airframe General parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe General parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                                  :<value>
CellID                                   :<value>
PreambleGroup                            :<value>
SegmentNumber                            :<value>
FrameNumberOffset                        :<value>
EnableUplinkSubchannelRotation           :<value>
Uplink-DownlinkAllocation(%)             :<value>
```

**Command Modes**

Global command mode

### 4.7.19.5.2 Displaying Configuration Information for Airframe Map Zone Parameters

To display configuration for the Airframe Map Zone parameters, run the following command:

**npu# show airframe-mapzone bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Map Zone parameters of BS 66503, run the following command:

**npu# show airframe-mapzone bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-mapzone bs**

**Command Syntax**

**npu# show airframe-mapzone bs** [<(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Airframe Map Zone parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Map Zone parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                          :<value>
MapZoneSize(symbols)             :<value>
MapMajorGroups                   :<value>
BasicMapRepetitions              :<value>
```

**Command Modes**

Global command mode

### 4.7.19.5.3 Displaying Configuration Information for Airframe Downlink Diversity Parameters

To display configuration for the Airframe Downlink Diversity parameters, run the following command:

**npu# show airframe-dldiversity bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Downlink Diversity parameters of BS 66503, run the following command:

**npu# show airframe-dldiversity bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-dldiversity bs**

**Command Syntax**

**npu# show airframe-mapzone bs** [<(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Airframe Downlink Diversity parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Downlink Diversity parameters of all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format**<br>(for each existing Neighbour BS in each of the existing BSs if requested for all) | `BSIDLSB :<value>`<br>`DownlinkDataDiversityMode :<value>` |
| **Command Modes** | Global command mode |

#### 4.7.19.5.4 Displaying Configuration Information for Airframe Cyclic Delay Parameters

To display configuration for the Airframe Cyclic Delay parameters, run the following command:

**npu# show airframe-cyclicdelay bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Cyclic Delay parameters of BS 66503, run the following command:

**npu# show airframe-cyclicdelay bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-cyclicdelay bs**

| | |
|---|---|
| **Command Syntax** | **npu# show airframe-cyclicdelay bs** [<(1 to 16777215 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Airframe Cyclic Delay parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Cyclic Delay parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                                    :<value>
CyclicDelayChannel1(microseconds)          :<value>
CyclicDelayChannel2(microseconds)          :<value>
CyclicDelayChannel3(microseconds)          :<value>
CyclicDelayChannel4(microseconds)          :<value>
```

**Command Modes**

Global command mode

### 4.7.19.5.5 Displaying Configuration Information for Airframe Linear Delay Parameters

To display configuration for the Airframe Linear Delay parameters, run the following command:

**npu# show airframe-lineardelay bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Linear Delay parameters of BS 66503, run the following command:

**npu# show airframe-lineardelay bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-lineardelay bs**

**Command Syntax**

**npu# show airframe-lineardelay bs** [<(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Airframe Linear Delay parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Linear Delay parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                                  :<value>
LinearDelayChannel1(microseconds)        :<value>
LinearDelayChannel2(microseconds)        :<value>
LinearDelayChannel3(microseconds)        :<value>
LinearDelayChannel4(microseconds)        :<value>
```

**Command Modes**

Global command mode

### 4.7.19.5.6 Displaying Configuration Information for Airframe Mapping Parameters

To display configuration for the Airframe Mapping parameters, run the following command:

**npu# show airframe-mapping bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Mapping parameters of BS 66503, run the following command:

**npu# show airframe-mapping bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-mapping bs**

**Command Syntax**

**npu# show airframe-mapping bs** [<(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Airframe Mapping parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Mapping parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                                  :<value>
LogicalStramMappingChannel1              :<value>
LogicalStramMappingChannel2              :<value>
LogicalStramMappingChannel3              :<value>
LogicalStramMappingChannel4              :<value>
```

| | |
|---|---|
| **Command Modes** | Global command mode |

### 4.7.19.5.7 Displaying Configuration Information for Airframe Receive Parameters

To display configuration for the Airframe Receive parameters, run the following command:

**npu# show airframe-rx bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Receive parameters of BS 66503, run the following command:

**npu# show airframe-rx bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-rx bs**

| | |
|---|---|
| **Command Syntax** | **npu# show airframe-rx bs** [<(1 to 16777215 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Airframe Receive parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Receive parameters of all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format**<br>(for each existing Neighbour BS in each of the existing BSs if requested for all) | `BSIDLSB :<value>`<br>`AdminStatusChannel1 :<value>`<br>`AdminStatusChannel2 :<value>`<br>`AdminStatusChannel3 :<value>`<br>`AdminStatusChannel4 :<value>` |
| **Command Modes** | Global command mode |

#### 4.7.19.5.8 Displaying Configuration Information for Airframe Uplink Feedback Zone Parameters

To display configuration for the Airframe Uplink Feedback Zone parameters, run the following command:

**npu# show airframe-ulfeedbackzone bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Uplink Feedback Zone parameters of BS 66503, run the following command:

**npu# show airframe-ulfeedbackzone bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-ulfeedbackzone bs**

| | |
|---|---|
| **Command Syntax** | **npu# show airframe-ulfeedbackzone bs** [<(1 to 16777215 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Airframe Uplink Feedback Zone parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Uplink Feedback Zone parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                                    :<value>
ULFeedbackZoneNumberofSub-Channels         :<value>
ULFeedbackZonePermutationBase              :<value>
```

**Command Modes**

Global command mode

### 4.7.19.5.9 Displaying Configuration Information for Airframe Downlink Data Zone Parameters

To display configuration for the Airframe Downlink Data Zone parameters, run the following command:

**npu# show airframe-dldatazone bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Downlink Data Zone parameters of BS 66503, run the following command:

**npu# show airframe-dldatazone bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-dldatazone bs**

**Command Syntax**

**npu# show airframe-dldatazone bs** [<(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Airframe Downlink Data Zone parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Downlink Data Zone parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                                  :<value>
DLDATAZoneNumberofSub-Channels           :<value>
DLDATAZonePermutationBase                :<value>
```

**Command Modes**

Global command mode

### 4.7.19.5.10 Displaying Configuration Information for Airframe Uplink Data Zone Parameters

To display configuration for the Airframe Uplink Data Zone parameters, run the following command:

**npu# show airframe-uldatazone bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Uplink Data Zone parameters of BS 66503, run the following command:

**npu# show airframe-uldatazone bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-uldatazone bs**

**Command Syntax**

**npu# show airframe-uldatazone bs** [<(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Airframe Uplink Data Zone parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Uplink Data Zone parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                                  :<value>
ULDATAPermutationBase                    :<value>
StartAllocation(Slots)                   :<value>
ULDATAZoneNumberofSub-Channels           :<value>
```

**Command Modes** Global command mode

### 4.7.19.5.11 Displaying Configuration Information for Airframe Dynamic Permutation Parameters

To display configuration for the Airframe Dynamic Permutation parameters, run the following command:

**npu# show airframe-dynamicperm bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Airframe Dynamic Permutation parameters of BS 66503, run the following command:

**npu# show airframe-dynamicperm bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-dynamicperm bs**

**Command Syntax** **npu# show airframe-dynamicperm bs** [<(1 to 16777215 StepSize 1)> ]

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Airframe Dynamic Permutation parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Dynamic Permutation parameters of all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format**<br>(for each existing Neighbour BS in each of the existing BSs if requested for all) | `BSIDLSB :<value>`<br>`DownlinkPermutationBase :<value>`<br>`UplinkPermutationBase :<value>` |
| **Command Modes** | Global command mode |

### 4.7.19.5.12 Displaying Configuration Information for All Airframe Parameters

To display configuration for all Airframe parameters, run the following command:

**npu# show airframe-all bs** [<(1 to 16777215 StepSize 1)> ]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display all Airframe parameters of BS 66503, run the following command:

**npu# show airframe-all bs 66053**

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show airframe-all bs**

| | |
|---|---|
| **Command Syntax** | **npu# show airframe-all bs** [<(1 to 16777215 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display all Airframe parameters of a specific BS. Do not specify a value for this parameter if you want to display all Airframe parameters of all BSs. | Optional | N/A | 1-16777215 |

**Command Modes** Global command mode

## 4.7.20 Managing Rate Adaptation Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Rate Adaptation parameters (refer to Section 4.7.20.1).
- Restore the default values of some or all of the Rate Adaptation parameters (refer to Section 4.7.20.2).

You can display configuration information for the Rate Adaptation parameters of a selected or all existing BSs (refer to Section 4.7.20.3).

### 4.7.20.1 Configuring Rate Adaptation Parameters

**To configure the Rate Adaptation parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# rateadapt-general** [dl-basicrate {ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo | ctcQpskThreeOverFour | ctcQamSixteenOneOverTwo | ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo | ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour | ctcQamSixtyFourFiveOverSix}] [ul-basicrate

{ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo | ctcQpskThreeOverFour |ctcQamSixteenOneOverTwo | ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo | ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour | ctcQamSixtyFourFiveOverSix}] [mincinr-qpsk-1by2-rep6 <(-20 to 30 StepSize 0.1)>] [mincinr-qpsk-1by2-rep4 <(-20 to 30 StepSize 0.1)>] [mincinr-qpsk-1by2-rep2 <(-20 to 30 StepSize 0.1)>] [mincinr-qpsk-1by2 <(-20 to 30 StepSize 1)>] [mincinr-qpsk-3by4 <(-20 to 30 StepSize 1)>] [mincinr-qam16-1by2 <(-20 to 30 StepSize 0.1)>] [mincinr-qam16-3by4 <(-20 to 30 StepSize 0.1)>] [mincinr-qam64-1by2 <(-20 to 30 StepSize 0.1)>] [mincinr-qam64-2by3 <(-20 to 30 StepSize 0.1)>] [mincinr-qam64-3by4 <(-20 to 30 StepSize 0.1)>] [mincinr-qam64-5by6 <(-20 to 30 StepSize 0.1)>]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)#** `[dl-basicrate {ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo | ctcQpskThreeOverFour | ctcQamSixteenOneOverTwo | ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo | ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour | ctcQamSixtyFourFiveOverSix} ] [ul-basicrate {ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo | ctcQpskThreeOverFour |ctcQamSixteenOneOverTwo | ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo | ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour | ctcQamSixtyFourFiveOverSix} ] [mincinr-qpsk-1by2-rep6 <(-20 to 30 StepSize 0.1)> ] [mincinr-qpsk-1by2-rep4 <(-20 to 30 StepSize 0.1)> ] [mincinr-qpsk-1by2-rep2 <(-20 to 30 StepSize 0.1)> ] [mincinr-qpsk-1by2 <(-20 to 30 StepSize 1)> ] [mincinr-qpsk-3by4 <(-20 to 30 StepSize 1)> ] [mincinr-qam16-1by2 <(-20 to 30 StepSize 0.1)> ] [mincinr-qam16-3by4 <(-20 to 30 StepSize 0.1)> ] [mincinr-qam64-1by2 <(-20 to 30 StepSize 0.1)> ] [mincinr-qam64-2by3 <(-20 to 30 StepSize 0.1)> ] [mincinr-qam64-3by4 <(-20 to 30 StepSize 0.1)> ] [mincinr-qam64-5by6 <(-20 to 30 StepSize 0.1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| dl-basicrate {ctcQpskOneOverTwoTimesSix \| ctcQpskOneOverTwoTimesFour \| ctcQpskOneOverTwoTimesTwo \| ctcQpskOneOverTwo \| ctcQpskThreeOverFour \| ctcQamSixteenOneOverTwo \| ctcQamSixteenThreeOverFour \| ctcQamSixtyFourOneOverTwo \| ctcQamSixtyFourTwoOverThree \| ctcQamSixtyFourThreeOverFour \| ctcQamSixtyFourFiveOverSix} | The downlink basic rate | Optional | ctcQpskOneOverTwoTimesSix | ■ ctcQpskOneOverTwoTimesSix<br>■ ctcQpskOneOverTwoTimesFour<br>■ ctcQpskOneOverTwoTimesTwo<br>■ ctcQpskOneOverTwo<br>■ ctcQpskThreeOverFour<br>■ ctcQamSixteenOneOverTwo<br>■ ctcQamSixteenThreeOverFour<br>■ ctcQamSixtyFourOneOverTwo<br>■ ctcQamSixtyFourTwoOverThree<br>■ ctcQamSixtyFourThreeOverFour<br>■ ctcQamSixtyFourFiveOverSix |

| | | | | |
|---|---|---|---|---|
| ul-basicrate {ctcQpskOneOverTwoTimesSix \| ctcQpskOneOverTwoTimesFour \| ctcQpskOneOverTwoTimesTwo \| ctcQpskOneOverTwo \| ctcQpskThreeOverFour \| ctcQamSixteenOneOverTwo \| ctcQamSixteenThreeOverFour \| ctcQamSixtyFourOneOverTwo \| ctcQamSixtyFourTwoOverThree \| ctcQamSixtyFourThreeOverFour \| ctcQamSixtyFourFiveOverSix} | The uplink basic rate | Optional | ctcQpskOneOverTwo | ■ ctcQpskOneOverTwoTimesSix<br>■ ctcQpskOneOverTwoTimesFour<br>■ ctcQpskOneOverTwoTimesTwo<br>■ ctcQpskOneOverTwo<br>■ ctcQpskThreeOverFour<br>■ ctcQamSixteenOneOverTwo<br>■ ctcQamSixteenThreeOverFour<br>■ ctcQamSixtyFourOneOverTwo<br>■ ctcQamSixtyFourTwoOverThree<br>■ ctcQamSixtyFourThreeOverFour<br>■ ctcQamSixtyFourFiveOverSix |
| mincinr-qpsk-1by2-rep6 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow QPSK 1/2 Repetition 6 Uplink transmissions.<br>Cannot be higher than mincinr-qpsk-1by2-rep4 | Optional | -20 | -20 to 30 in steps of 0.1 |

| | | | | |
|---|---|---|---|---|
| mincinr-qpsk-1by2-rep4 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow QPSK 1/2 Repetition 4 Uplink transmissions.<br><br>Must be in the range from mincinr-qpsk-1by2-rep6 to mincinr-qpsk-1by2-rep2 | Optional | -20 | -20 to 30 in steps of 0.1 |
| mincinr-qpsk-1by2-rep2 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow QPSK 1/2 Repetition 2 Uplink transmissions.<br><br>Must be in the range from mincinr-qpsk-1by2-rep4 to mincinr-qpsk-1by2 | Optional | -20 | -20 to 30 in steps of 0.1 |
| mincinr-qpsk-1by2 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow QPSK 1/2 Uplink transmissions.<br><br>Must be in the range from mincinr-qpsk-1by2-rep2 to mincinr-qpsk-3by4 | Optional | -20 | -20 to 30 in steps of 0.1 |
| mincinr-qpsk-3by4 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow QPSK 3/4 Uplink transmissions.<br><br>Must be in the range from mincinr-qpsk-1by2 to mincinr-qam16-1by2 | Optional | -20 | -20 to 30 in steps of 0.1 |

| | | | | | |
|---|---|---|---|---|---|
| | mincinr-qam16-1by2 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow 16QAM 1/2 Uplink transmissions.<br>Must be in the range from mincinr-qpsk-3by4 to mincinr-qam16-3by4 | Optional | -20 | -20 to 30 in steps of 0.1 |
| | mincinr-qam16-3by4 <(-20 to 50 StepSize 1)> | The minimal CINR in dB Required to allow 16QAM 3/4 Uplink transmissions.<br>Must be in the range from mincinr-qam16-1by2 to mincinr-qam64-1by2 | Optional | -20 | -20 to 30 in steps of 0.1 |
| | mincinr-qam64-1by2 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow 64QAM 1/2 Uplink transmissions.<br>Must be in the range from mincinr-qam16-3by4 to mincinr-qam64-2by3 | Optional | -20 | -20 to 30 in steps of 0.1 |
| | mincinr-qam64-2by3 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow 64QAM 2/3 Uplink transmissions.<br>Must be in the range from mincinr-qam64-1by2 to mincinr-qam64-3by4 | Optional | -20 | -20 to 30 in steps of 0.1 |

| | | | | | |
|---|---|---|---|---|---|
| | mincinr-qam64-3by4 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow 64QAM 3/4 Uplink transmissions.<br>Must be in the range from mincinr-qam64-2by3 to mincinr-qam64-5by6 | Optional | -20 | -20 to 30 in steps of 0.1 |
| | mincinr-qam64-5by6 <(-20 to 30 StepSize 0.1)> | The minimal CINR in dB Required to allow 64QAM 5/6 Uplink transmissions.<br>Cannot be lower than mincinr-qam64-3by4 | Optional | -20 | -20 to 30 in steps of 0.1 |

**Command Modes** bs configuration mode

**IMPORTANT**

When creating a new BS, at least one of the Rate Adaptation parameters must be configured explicitly (even if configured to the default value).

### 4.7.20.2 Restoring the Default Values of Rate Adaptation Parametes

To restore the default values of some or all of the Rate Adaptation parameters, run the following command:

**npu(config-bs-66053)# no rateadapt-general** [dl-basicrate] [ul-basicrate] [mincinr-qpsk-1by2-rep6] [mincinr-qpsk-1by2-rep4] [mincinr-qpsk-1by2-rep2 >] [mincinr-qpsk-1by2] [mincinr-qpsk-3by4] [mincinr-qam16-1by2] [mincinr-qam16-3by4] [mincinr-qam64-1by2] [mincinr-qam64-2by3] [mincinr-qam64-3by4] [mincinr-qam64-5by6]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the ul-basicrate parameter to the default value, run the following command:

**npu(config-bs-66053)# no rateadapt-general ul-basicrate**

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Rate Adaptation parameters to their default value, run the following command:

**npu(config-bs-66053)# no rateadapt-general**

**NOTE**

Refer to Section 4.7.20.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# rateadapt-general** `[dl-basicrate ] [ul-basicrate ] [mincinr-qpsk-1by2-rep6 ] [mincinr-qpsk-1by2-rep4 ] [mincinr-qpsk-1by2-rep2 > ] [mincinr-qpsk-1by2 ] [mincinr-qpsk-3by4 ] [mincinr-qam16-1by2 ] [mincinr-qam16-3by4 ] [mincinr-qam64-1by2 ] [mincinr-qam64-2by3 ] [mincinr-qam64-3by4 ] [mincinr-qam64-5by6 ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.20.3 Displaying Configuration for Rate Adaptation Parameters

To display configuration information of Rate Adaptation parameters, run the following command:

**npu# show rateadapt-general bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Rate Adaptation parameters of BS 66053, run the following command:

**npu# show rateadapt-general bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show rateadapt-general bs**

**Command Syntax**

**npu# show rateadapt-general bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display Rate Adaptation parameters of a specific BS. Do not specify a value for this parameter if you want to display Rate Adaptation parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
DownlinkBasicRate                        :<value>

UplinkBasicRate                          :<value>
MinCinrQpskCtc1/2Rep6                    :<value>
MinCINRQpskCtc1/2Rep4                    :<value>
MinCINRQpskCtc1/2Rep2                    :<value>
MinCINRQpskCtc1/2                        :<value>
MinCINRQpskCtc3/4                        :<value>
MinCINRQam16Ctc1/2                       :<value>
MinCINRQam16Ctc3/4                       :<value>
MinCINRQam64Ctc1/2                       :<value>
MinCINRQam64Ctc2/3                       :<value>
MinCINRQam64Ctc3/4                       :<value>
MinCINRQam64Ctc5/6                       :<value>
```

| | |
|---|---|
| **Command Modes** | Global command mode |

## 4.7.21 Managing BS Bearer Interface Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Bearer Interface parameters (refer to Section 4.7.21.1).
- Restore the default values of some or all of the Bearer Interface parameters (refer to Section 4.7.21.2).

You can display configuration information for the Bearer Interface parameters of a selected or all existing BSs (refer to Section 4.7.21.3).

### 4.7.21.1 Configuring Bearer Interface Parameters

**To configure the Bearer Interface Parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# bearer** [ip-address <ip address> ] [ip-subnetmask <ip address> ] [dflt-gw <ip address> ] [mtu-size <(1500 to 9000 StepSize 1)> ] [linkusage-hardthrshld <(0 to100 StepSize 1)> ]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# bearer** `[ip-address <ip address> ] [ip-subnetmask <ip address> ] [dflt-gw <ip address> ] [mtu-size <(1500 to 9000 StepSize 1)> ] [linkusage-hardthrshld <(0 to100 StepSize 1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [ip-address <ip address> ] | The IP address of the bearer interface of the BS | Mandatory when creating a new BSI | N/A | IP address |

| | | | | | |
|---|---|---|---|---|---|
| | [ip-subnetmask <ip address> ] | The IP subnet mask of the bearer interface of the BS | Mandatory when creating a new BSI | N/A | Subnet mask |
| | [dflt-gw <ip address> ] | The IP address of the default gateway of the bearer interface of the BS | Mandatory when creating a new BSI | N/A | IP address |
| | [mtu-size <(1500 to 9000 StepSize 1)> ] | MTU size (in bytes) of the bearer interface of the BS | Optional | 1500 | 1500 - 9000 |
| | [linkusage-hardthrshld <(0 to 100 StepSize 1)> ] | The BS backplane usage hard limit threshold, in percecents. An alarm if sent if either uplink or downlink backplane link usage exceeds the threshold. | Optional | 80 | 0 - 100 |

**Command Modes** bs configuration mode

**IMPORTANT**

When creating a new BS, the Bearer Interface mandatory parameters must be configured.

### 4.7.21.2 Restoring the Default Values of Bearer Interface Parametes

To restore the default values of some or all of the Bearer Interface parameters, run the following command:

**npu(config-bs-66053)# no bearer** [mtu-size ] [linkusage-hardthrshld ]

You can restore only one parameter to the default values by specifying only that parameters. For example, to restore only the mtu-size parameter to the default value, run the following command:

**npu(config-bs-66053)# no bearer mtu-size**

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Bearer Interface parameters to their default value, run the following command:

**npu(config-bs-66053)# no bearer**

**NOTE**

Refer to Section 4.7.21.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no bearer** `[mtu-size ] [linkusage-hardthrshld ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.21.3 Displaying Configuration Information for Bearer Interface Parameters

To display configuration information of Bearer Interface parameters, run the following command:

**npu# show bearer bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Bearer Interface parameters of BS 66053, run the following command:

**npu# show bearer bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show bearer bs**

| | |
|---|---|
| **Command Syntax** | **npu# show bearer bs** [<(1 to 16777215 StepSize 1) |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display Bearer Interface parameters of a specific BS. Do not specify a value for this parameter if you want to display Bearer Interface parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                          :<value>
IPAddress                        :<value>
IPsubnetMask                     :<value>
DefaultGateway                   :<value>
MTUSize                          :<value>
LinkUsageHardThreshold(%)        :<value>
```

**Command Modes**

Global command mode

## 4.7.22 Managing Authentication Relay Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Authentication parameters (refer to Section 4.7.22.1).
- Restore the default values of some or all of the Authentication non-mandatory parameters (refer to Section 4.7.22.2).

You can display configuration information for the Authentication parameters of a selected or all existing BSs (refer to Section 4.7.22.3).

### 4.7.22.1 Configuring Authentication Parameters

**To configure the Authentication parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# auth-general** [dflt-auth-ip-address <ip address> ] [suspendedeapprocthrshld <(0 to 10000 StepSize 1)> ] [activemsthrshld <(0 to 1024 StepSize 1)> ] [maxeaproundsthrshld <(0 to 100 StepSize 1)> ] [nonauth-macctrlratethrshld <(0 to 120000 StepSize 1)> ] [nonauth-pduratethrshld <(0 to 120000 StepSize 1)> ]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# auth-general** `[dflt-auth-ip-address <ip address> ] [suspendedeapprocthrshld <(0 to 10000 StepSize 1)> ] [activemsthrshld <(0 to 1024 StepSize 1)> ] [maxeaproundsthrshld <(0 to 100 StepSize 1)> ] [nonauth-macctrlratethrshld <(0 to 120000 StepSize 1)> ] [nonauth-pduratethrshld <(0 to 120000 StepSize 1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [dflt-auth-ip-address <ip address> ] | Identifier (IP address) of “default” authenticator ASN GW. | Mandatory when creating a new BS. | N/A | IPv4 address |
| [suspendedeapprocthrshld <(0 to 10000 StepSize 1)> ] | Suspended EAP authentification process threshold. It is used to set an alarm. | Optional | 0 | 0 to 10000 |

| | | | | | |
|---|---|---|---|---|---|
| | [activemsthrshld <(0 to 1024 StepSize 1)> ] | Threshold for the number of MSs in active operation state (not Idle) served by the BS. Exceeding this threshold will set the alarm “Excessive MS number”.<br><br>A value of 0 means that the alarm is disabled. | Optional | 0 | 0 to 1024 |
| | [maxeaproundsthrshld <(0 to 100 StepSize 1)> ] | Threshold for the number of EAP rounds in one direction in the same EAP session. When exceeding this threshold; alarm is set. May be used to protect the system from hazard EAP sessions with extreme number of messaging round trips. A value of "0" means the alarm is disabled.<br><br>A value of 0 means that the alarm is disabled. | Optional | 0 | 0 to 100 |
| | [nonauth-macctrlratethrshld <(0 to 120000 StepSize 1)> ] | Threshold for alarm for exceeding non-authentic MAC control rate, in Kbps<br><br>A value of 0 means that the alarm is disabled. | Optional | 0 | 0 to 120000 |
| | [nonauth-pduratethrshld <(0 to 120000 StepSize 1)> ] | Threshold for alarm for exceeding non-authentic PDU rate (in Kbps).<br><br>A value of 0 means that the alarm is disabled. | Optional | 0 | 0 to 120000 |

**Command Modes**

bs configuration mode

**IMPORTANT**

When creating a new BS, the Authentication dflt-auth-ip-address mandatory parameter must be configured.

### 4.7.22.2 Restoring the Default Values of Authentication Parametes

To restore the default values of some or all of the Authentication parameters, run the following command:

**npu(config-bs-66053)# no auth-general** [suspendedeapprocthrshld ] [activemsthrshld ] [maxeaproundsthrshld ] [nonauth-macctrlratethrshld ] [nonauth-pduratethrshld ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the activemsthrshld and maxeaproundsthrshld parameters to the default values, run the following command:

**npu(config-bs-66053)# no auth-general activemsthrshld maxeaproundsthrshld**

These parameters will be restored to their default values, while the other parameters will remain unchanged.

To restore all Authentication parameters to their default value, run the following command:

**npu(config-bs-66053)# no auth-general**

**NOTE**

Refer to Section 4.7.22.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no auth-general** `[suspendedeapprocthrshld ] [activemsthrshld ] [maxeaproundsthrshld ] [nonauth-macctrlratethrshld ] [nonauth-pduratethrshld ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.22.3 Displaying Configuration Information for Authentication Parameters

To display configuration information of Authentication parameters, run the following command:

**npu# show auth-general bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Authentication parameters of BS 66053, run the following command:

**npu# show auth-general bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show auth-general bs**

**Command Syntax**

**npu# show auth-general bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display Authentication parameters of a specific BS. Do not specify a value for this parameter if you want to display Authentication parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
```

**Command Modes**

Global command mode

## 4.7.23 Managing Handover Control Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Handover Control parameters (refer to Section 4.7.23.1).
- Restore the default values of some or all of the Handover Control parameters (refer to Section 4.7.23.2).

You can display configuration information for the Handover Control parameters of a selected or all existing BSs (refer to Section 4.7.23.3).

### 4.7.23.1 Configuring Handover Control Parameters

**To configure the Handover Control parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# hoctrl** [enable-teksharing <hex-string>] [rtxtimer <(0 to 255 StepSize 1)> ]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# hoctrl** `[enable-teksharing <hex-string>] [rtxtimer <(0 to 255 StepSize 1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | enable-teksharing <hex-string> | 2 hexadecimal digits that can be represented as 8 bits iIdentifying re-entry process management messages that may be omitted during the current HO attempt. The omission is due to the availability of MS service and operational context information and the MS service and operational status post-HO completion.<br><br>Currently only bit 2 can be modified: A value of “ff” (bit 2 = 1) means that PKM TEK creation phase is omitted (TEK Sharing is enabled). A value of “cf (bit 2 = 0) means that the message is not omitted (TEK Sharing is disabled). | Optional | ff | ■ ff<br>■ fb |
| | rtxtimer <(0 to 255 StepSize 1)> | MS Handover Retransmission Timer: After an MS transmits MOB_MSHO-REQ to initiate a handover process it shall start MS Handover Retransmission Timer and shall not transmit another MOB_MSHO-REQ until the expiration of the MS Handover Retransmission Timer. | Optional | 10 | 0 - 255 |

**Command Modes**

bs configuration mode

**IMPORTANT**

When creating a new BS, at least one of the Handover Control parameters must be configured explicitly (even if configured to the default value).

### 4.7.23.2 Restoring the Default Values of Handover Control Parametes

To restore the default values of some or all of the Handover Control parameters, run the following command:

**npu(config-bs-66053)# no hoctrl** [enable-teksharing ] [rtxtimer ]

You can restore only one parameter to the default values by specifying only that parameter. For example, to restore only the rtxtimer parameter to the default value, run the following command:

**npu(config-bs-66053)# no hoctrl  rtxtimer**

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Handover Control parameters to their default value, run the following command:

**npu(config-bs-66053)# no hoctrl**

**NOTE**

Refer to Section 4.7.23.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no hoctrl** [enable-teksharing ] [rtxtimer  ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.23.3 Displaying Configuration and Status Information for Handover Control Parameters

To display configuration and status information of Handover Control parameters, run the following command:

**npu# show hoctrl bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Handover Control parameters of BS 66053, run the following command:

**npu# show hoctrl bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show hoctrl bs**

**Command Syntax**

**npu# show hoctrl bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display Handover Control parameters of a specific BS. Do not specify a value for this parameter if you want to display Handover Control parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
EnableTEKSharing                         :<value>
MSHandoverRetransmissionTimer(frames)    :<value>
SchedulingServiceSupport                 :<value>
```

**Command Modes**

Global command mode

In addition to the configurable parameters, the following status parameter is also displayed:

| Parameter | Description | Possible Values |
|---|---|---|
| SchedulingServiceSupport | Scheduling Service Support. A string of two hexadecimal digits that can be presented as 8 bits where bits 5-7 are always 0. Bits 0-4 indicate whether specific services are supported, where a value of 1 means that the service is supported: UGS (0), RT-PS(1), NRT-PS(2), BE(3), ERT-PS(4).<br><br>This parameter is available for populating the srvcsupport parameter in the relevant Neighbour BS General parameters tables. | A string of two hexadecimal digits. |

## 4.7.24 Managing Bearer Traffic QoS Marking Rules

Up to 16383 Bearer Traffic QoS Marking Rules may be defined.

**To configure a Bearer Traffic QoS Marking Rule:**

1. Enable the BS Bearer Traffic QoS Marking Rule configuration mode for the selected Bearer Traffic QoS Marking Rule (refer to Section 4.7.24.1)
2. You can now execute any of the following tasks:
   - Configure the parameters of the Bearer Traffic QoS Marking Rule (refer to Section 4.7.24.2)
   - Restore the default values of Bearer Traffic QoS Marking Rule non-mandatory parameters (refer to Section 4.7.24.3)
   - Terminate the Bearer Traffic QoS Marking Rule configuration mode (refer to Section 4.7.24.4)

In addition, you can, at any time, display configuration information for Bearer Traffic QoS Marking Rules (refer to Section 4.7.24.6) or delete an existing Bearer Traffic QoS Marking Rule (refer to Section 4.7.24.5).

### 4.7.24.1 Enabling the Bearer Traffic QoS Marking Rule Configuration Mode\Creating a Bearer Traffic QoS Marking Rule

To configure the parameters of a Bearer Traffic QoS Marking Rule, first enable the BS Bearer Traffic QoS Marking Rule configuration mode for the specific Bearer Traffic QoS Marking Rule. Run the following command to enable the BS Bearer Traffic QoS Marking Rule configuration mode. You can also use this command to create a new Bearer Traffic QoS Marking Rule.

Note that for a new Bearer Traffic QoS Marking Rule this command only defines the Bearer Traffic QoS Marking Rule number, and that the Bearer Traffic QoS Marking Rule is not fully created until completing configuration of all mandatory parameters and executing the **apply** command (must be executed before exiting the Bearer Traffic QoS Marking Rule configuration mode). Also when updating an existing Bearer Traffic QoS Marking Rule, the **apply** command must be executed prior to termination the Bearer Traffic QoS Marking Rule configuration mode.

**npu(config-bs-66053)# bearertrafficqos** <(1 to 16383 StepSize 1)>

For example, to define a new Bearer Traffic QoS Marking Rule number 1, or to enable the configuration mode for Bearer Traffic QoS Marking Rule 1, run the following command:

**npu(config-bs-66053)# bearertrafficqos 1**

If you use this command to create a new Bearer Traffic QoS Marking Rule, the configuration mode for this Bearer Traffic QoS Marking Rule is automatically enabled, after which you can execute any of the following tasks:

- Configure one or more of the parameters of the Bearer Traffic QoS Marking Rule (refer to Section 4.7.24.2)
- Restore the default values of Bearer Traffic QoS Marking Rule non-mandatory parameters (refer to Section 4.7.24.3)

After executing the above tasks, you can terminate the Bearer Traffic QoS Marking Rule configuration mode (refer to Section 4.7.24.4) and return to the BS configuration mode.

Note that for properly completing the configuration of a Bearer Traffic QoS Marking Rule the **apply** command must be executed prior to exiting the Bearer Traffic QoS Marking Rule configuration mode.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# bearertrafficqos** <(1 to 16383 StepSize 1)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| bearertrafficqos <(1 to 16383 StepSize 1)> | The Bearer Traffic QoS Marking Rule number | Mandatory | | 1 - 16383 |

| | |
|---|---|
| **Command Modes** | BS configuration mode |

For example, to define Bearer Traffic QoS Marking Rule 1 for BS 66053, run the following command:

**npu(config-bs-66053)# bearertrafficqos 1**

**NOTE**

The following examples are for BS Bearer Traffic QoS Marking Rule configuration mode for bs-66053, bearer traffic qos marking rule (bearertrafficqos)-1..

## 4.7.24.2 Configuring Bearer Traffic QoS Marking Rule Parameters

To configure the Bearer Traffic QoS Marking Rule parameters, run the following command:

**npu(config-bs-66053-bearertrafficqos-1)# mrkngrule** [rule-status {Enable | Disable} ] [rule-name <string (32)> ] [srvcflow-datadeliverytype {uGS | bE | eRTVR | any} ] [srvcflow-trafficpriority <(0 to 7 StepSize 1) | (255 to 255 StepSize 1)> ] [srvcflow-mediaflowtype <string (32)> ] [enable-srvcflow-mediaflowtype {TRUE | FALSE} ] [outerdscp <(0 to 63 StepSize 1)> ] [bp8021p <(0 to 7 StepSize 1)> ]

**IMPORTANT**

When creating a new Bearer Traffic QoS Marking Rule Rule, the mandatory parameters must be configured.

**Command Syntax**

**npu(config-bs-66053-bearertrafficqos-1)# mrkngrule** `[rule-status {Enable | Disable} ] [rule-name <string (32)> ] [srvcflow-datadeliverytype {uGS | bE | eRTVR | any} ] [srvcflow-trafficpriority <(0 to 7 StepSize 1) | (255 to 255 StepSize 1)> ] [srvcflow-mediaflowtype <string (32)> ] [enable-srvcflow-mediaflowtype {TRUE | FALSE} ] [outerdscp <(0 to 63 StepSize 1)> ] [bp8021p <(0 to 7 StepSize 1)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| rule-status {Enable \| Disable} | The Bearer Traffic QoS Marking Rule status | Optional | Enable | ■ Enable<br>■ Disable |
| rule-name <string (32)> | The Bearer Traffic QoS Marking Rule name (descriptor). | Optional | null | A string of up to 32 characters |
| srvcflow-datadelivery type {uGS \| bE \| eRTVR \| any} | Service Flow Type of data delivery services. | Optional | any | ■ uGS<br>■ bE<br>■ eRTVR<br>■ any |
| srvcflow-trafficpriority <(0 to 7 StepSize 1) \| (255 to 255 StepSize 1)> | Service Flow Traffic Priority. A value of 255 means "ANY" | Optional | 255 | 0-7 or 255 |
| srvcflow-mediaflowtype <string (32)> | One of key entries into the traffic marking rules table. Media Flow Type should be defined in ASN-GW or AAA server.<br>Only relevant if enable-srvcflow-mediaflowtype (see below) is TRUE. | Mandatory when creating a new rule (if relevant) | N/A | A string of up to 32 characters |

| | | | | | |
|---|---|---|---|---|---|
| | enable-srvcflow-mediaflowtype {TRUE \| FALSE} | If TRUE, the srvcflow-mediaflowtype (see above) will be considered. when looking for a match. If FALSE it will not be considered. | Mandatory when creating a new rule | | ■ TRUE<br>■ FALSE |
| | outerdscp <(0 to 63 StepSize 1)> | DSCP value to be used for marking of outer IP header (IP/GRE). | Optional | 0 | 0 - 63 |
| | bp8021p <(0 to 7 StepSize 1)> | 802.1p priority to be used for marking of traffic | Optional | 0 | 0 - 7 |

**Command Modes** bs bearer traffic qos marking rule configuration mode

### 4.7.24.3 Restoring Default Values for Bearer Traffic QoS Marking Rule Configuration Parameters

After enabling the Bearer Traffic QoS Marking Rule configuration mode you can restore the default values for non-mandatory parameters.

To restore some or all of the Bearer Traffic QoS Marking Rule non-mandatory parameters to their default values, run the following command:

**npu(config-bs-66053-bearertrafficqos-1)# no mrkngrule** [rule-status] [rule-name] [srvcflow-datadeliverytype [srvcflow-trafficpriority] [outerdscp] [bp8021p]

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the outerdscp to the default value, run the following command:

**npu(config-bs-66053-bearertrafficqos-1)# no mrkngrule outerdscp**

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Bearer Traffic QoS Marking Rule non-mandatory parameters to their default value, run the following command:

**npu(config-bs-66053-bearertrafficqos-1)# no mrkngrule**

**NOTE**

Refer to Section 4.7.24.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-bearertrafficqos-1)# no mrkngrule** [rule-status ] [rule-name ] [srvcflow-datadeliverytype [srvcflow-trafficpriority ] [outerdscp ] [bp8021p ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs bearer traffic qos marking rule configuration mode |

### 4.7.24.4 Terminating the Bearer Traffic QoS Marking Rule Configuration Mode

Run the following command to terminate the Bearer Traffic QoS Marking Rule configuration mode:

**npu(config-bs-66053-bearertrafficqos-1)# exit**

**IMPORTANT**

Do not forget to execute the apply command before terminating the BS Bearer Traffic QoS Marking Rule configuration mode:

**npu(config-bs-66053-bearertrafficqos-1)# apply**

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-bearertrafficqos-1)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | bs bearer traffic qos marking rule configuration mode |

### 4.7.24.5 Deleting a Bearer Traffic QoS Marking Rule

Run the following command from the BS configuration mode to delete a Bearer Traffic QoS Marking Rule:

**npu(config-bs 66053)# no bearertrafficqos** <(1 to 16383 StepSize 1)>

**Command Syntax** npu(config-bs 66053)# no bearertrafficqos <(1 to 16383 StepSize 1)>

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16383 StepSize 1)> | The Bearer Traffic QoS Marking Rule number | Mandatory | N/A | 1-16383 |

**Command Modes** bs configuration mode

## 4.7.24.6 Displaying Configuration Information for Bearer Traffic QoS Marking Rules

To display configuration for the parameters of a specific or all Bearer Traffic QoS Marking Rules , run the following command:

**npu# show bearertrafficqos bs** [<(1 to 16777215 StepSize 1)> number <(1 to 16383 StepSize 1)>]

Specify the BS ID and Bearer Traffic QoS Marking Rule number if you want to display configuration for a particular Bearer Traffic QoS Marking Rule. For example, to display the parameters of Bearer Traffic QoS Marking Rule 1 in BS 66053, run the following command:

**npu# show bearertrafficqos bs 66053 number 1**

Do not specify these parameters if you want to view configuration information for all existing Bearer Traffic QoS Marking Rules. To display information for all Bearer Traffic QoS Marking Rules, run the following command:

**npu# show bearertrafficqos bs**

**Command Syntax** npu# show bearertrafficqos bs [<(1 to 16777215 StepSize 1)> number <(1 to 16383 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the parameters of a specific Bearer Traffic QoS Marking Rule. Do not specify a value for this parameter if you want to display the parameters of all Bearer Traffic QoS Marking Rules. | Optional | N/A | 1-16777215 |
| number <(1 to 16383 StepSize 1)> ] | The Bearer Traffic QoS Marking Rule number. To be used only if you want to display the parameters of a specific Bearer Traffic QoS Marking Rule. | Optional | N/A | 1-16383 |

**Display Format**

(for each existing Service Mapping Rule if requested for all Service Mapping Rules)

```
BSIDLSB                                  :<value>
RuleNumber                               :<value>
RuleStatus                               :<value>
RuleName                                 :<value>
ServiceFlowMediaFlowType                 :<value>
ServiceFlowTrafficPriority(255meansany)  :<value>
ServiceFlowMediaFlowType                 :<value>
EnableServiceFlowMediaFlowType           :<value>
OuterDSCP                                :<value>
802.1pPriority                           :<value>
```

**Command Modes**

Global command mode

# 4.7.25 Managing Control Traffic QoS Marking Rules

**To configure the Control Traffic QoS Marking Rules:**

1. Enable the Control Traffic QoS Marking Rules configuration mode (refer to Section 4.7.25.1)
2. You can now execute any of the following tasks:
   - » Configure one or more of the Control Traffic QoS Marking Rules parameters tables (refer to Section 4.7.25.2)
   - » Restore the default values of parameters in one or more of the Control Traffic QoS Marking Rules parameters tables (refer to Section 4.7.25.3)
   - » Terminate the Control Traffic QoS Marking Rules configuration mode (refer to Section 4.7.25.4)

In addition, you can, at any time, display configuration information for each of the parameters tables (refer to Section 4.7.25.5).

## 4.7.25.1 Enabling the Control Traffic QoS Marking Rules Configuration Mode

To configure the Control Traffic QoS Marking Rules parameters, first enable the Control Traffic QoS Marking Rules configuration mode. Run the following command to enable the Control Traffic QoS Marking Rules configuration mode.

Note that for properly completing the configuration the **apply** command must be executed prior to exiting the Control Traffic QoS Marking Rules configuration mode.

**npu(config-bs-66053)# ctrltrafficqos**

The configuration mode for the Control Traffic QoS Marking Rules is enabled, after which you can execute any of the following tasks:

- Configure one or more of the Control Traffic QoS Marking Rules parameters tables (refer to Section 4.7.25.2)
- Restore the default values of parameters in one or more of the parameters tables (refer to Section 4.7.25.3)

After executing the above tasks, you can terminate the Control Traffic QoS Marking Rules configuration mode (refer to Section 4.7.25.4) and return to the BS configuration mode.

Note that for properly completing the Control Traffic QoS Marking Rules configuration the **apply** command must be executed prior to exiting the Control Traffic QoS Marking Rules configuration mode.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# ctrltrafficqos** |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

## 4.7.25.2 Configuring Control Traffic QoS Marking Rules Parameters

After enabling the Control Traffic QoS Marking Rules configuration mode you can configure the following parameters tables:

- Internal Management (refer to Section 4.7.25.2.1)
- Intra ASN (refer to Section 4.7.25.2.2)

**IMPORTANT**

After completing the Control Traffic QoS Marking Rules configuration,do not forget to execute the apply command before exiting the Control Traffic QoS Marking Rules configuration mode:
**npu(config-bs-66053-ctrltrafficqos)# apply**

### 4.7.25.2.1 Configuring Internal Management Traffic QoS Marking Rules Parameters

To configure the Internal Management Traffic QoS Marking Rules, run the following command:

**npu(config-bs-66053-ctrltrafficqos)# intmngmnt** [dscp <(0 to 63 StepSize 1)> ] [inter8021p <(0 to 7 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Internal Management Traffic QoS Marking Rules parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

**npu(config-bs-66053-ctrltrafficqos)# intmngmnt** [dscp <(0 to 63 StepSize 1)> ] [inter8021p <(0 to 7 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| dscp <(0 to 63 StepSize 1)> | DSCP priority value to be used for marking of internal management traffic | Optional | 0 | 0 - 63 |
| inter8021p <(0 to 7 StepSize 1)> | 802.1p priority value to be used for marking of internal management traffic | Optional | 0 | 0 - 7 |

**Command Modes**

bs control traffic qos marking rules (ctrltrafficqos) configuration mode

### 4.7.25.2.2 Configuring the Intra ASN Traffic QoS Marking Rules

To configure the Intra ASN Traffic QoS Marking Rules parameters, run the following command:

**npu(config-bs-66053-ctrltrafficqos)# intraasn** [dscp <(0 to 63 StepSize 1)> ] [intra8021p <(0 to 7 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Intra ASN Traffic QoS Marking Rules parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

**npu(config-bs-66053-ctrltrafficqos)# intraasn** [dscp <(0 to 63 StepSize 1)> ] [intra8021p <(0 to 7 StepSize 1)> ]

| | |
|---|---|
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| dscp <(0 to 63 StepSize 1)> | DSCP priority value to be used for marking of intra-ASN (R8/R6) traffic | Optional | 0 | 0 - 63 |
| intra8021p <(0 to 7 StepSize 1)> | 802.1p priority value to be used for marking of intra-ASN (R8/R6) traffic | Optional | 0 | 0 - 7 |

| | |
|---|---|
| **Command Modes** | bs control traffic qos marking rules (ctrltrafficqos) configuration mode |

## 4.7.25.3 Restoring Default Values for Control Traffic QoS Marking Rules Configuration Parameters

After enabling the Control Traffic QoS Marking Rules configuration mode you can restore the default values for parameters in the following parameters tables:

- Internal Management (refer to Section 4.7.25.3.1)
- Intra ASN (refer to Section 4.7.25.3.2)

### 4.7.25.3.1 Restoring the Default Values of Internal Management Traffic QoS Marking Rules Parameters

To restore one or all of the Internal Management Traffic QoS Marking Rules parameters to their default values, run the following command:

**npu(config-bs-66053-ctrltrafficqos)# no intmngmnt** [dscp ] [inter8021p ]

You can restore only one parameter to its default values by specifying only that parameter. For example, to restore only dscp to the default value, run the following command:

**npu(config-bs-66053-ctrltrafficqos)# no intmngmnt dscp**

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Internal Management Traffic QoS Marking Rules parameters to their default value, run the following command:

**npu(config-bs-66053-ctrltrafficqos)# no intmngmnt**

**NOTE**

Refer to Section 4.7.25.2.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-bs-66053-ctrltrafficqos)# no intmngmnt [dscp ] [inter8021p ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs control traffic qos marking rules (ctrltrafficqos) configuration mode |

### 4.7.25.3.2 Restoring the Default Values of Intra ASN Traffic QoS Marking Rules Parameters

To restore one or all of the Intra ASN Traffic QoS Marking Rules parameters to their default values, run the following command:

**npu(config-bs-66053-ctrltrafficqos)# no intraasn** [dscp ] [intra8021p ]

You can restore only one parameter to its default values by specifying only that parameter. For example, to restore only dscp to the default value, run the following command:

**npu(config-bs-66053-ctrltrafficqos)# no intraasn dscp**

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Intra ASN Traffic QoS Marking Rules parameters to their default value, run the following command:

**npu(config-bs-66053-ctrltrafficqos)# no intraasn**

**NOTE**

Refer to Section 4.7.25.2.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | `npu(config-bs-66053-ctrltrafficqos)# no intraasn [dscp ] [intra8021p ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs control traffic qos marking rules (ctrltrafficqos) configuration mode |

### 4.7.25.4 Terminating the Control Traffic QoS Marking Rules Configuration Mode

Run the following command to terminate the Control Traffic QoS Marking Rules configuration mode:

**npu(config-bs-66053-ctrltrafficqos)# exit**

**IMPORTANT**

Do not forget to execute the apply command before terminating the Control Traffic QoS Marking Rules configuration mode: **npu(config-bs-66053-ctrltrafficqos)# apply**

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ctrltrafficqos)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | bs control traffic qos marking rules (ctrltrafficqos) configuration mode |

### 4.7.25.5 Displaying Configuration Information for Control Traffic QoS Marking Rules Parameters

You can display the current configuration information for the following parameters tables:

- Internal Management (refer to Section 4.7.25.5.1)
- Intra ASN (refer to Section 4.7.25.5.2)

- All (refer to Section 4.7.25.5.3)

### 4.7.25.5.1 Displaying Configuration Information for Internal Management Traffic QoS Marking Rules Parameters

To display configuration for the Internal Management Traffic QoS Marking Rules parameters, run the following command:

**npu# show ctrltrafficqos-intmngmnt bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Internal Management Traffic QoS Marking Rules parameters of BS 66053, run the following command:

**npu# show ctrltrafficqos-intmngmnt bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ctrltrafficqos-intmngmnt bs**

**Command Syntax**

**npu# show ctrltrafficqos-intmngmnt bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Internal Management Traffic QoS Marking Rules parameters of a specific BS. Do not specify a value for this parameter if you want to display the Internal Management Traffic QoS Marking Rules parameters of all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format**<br>(for each existing BS if requested for all BSs) | `BSIDLSB :<value>`<br>`InternalManagementDSCP :<value>`<br>`InternalManagement802.1pPriority :<value>` |
| **Command Modes** | Global command mode |

### 4.7.25.5.2 Displaying Configuration Information for Intra ASN Traffic QoS Marking Rules Parameters

To display configuration for the Intra ASN Traffic QoS Marking Rules parameters, run the following command:

**npu# show ctrltrafficqos-intraasn bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Intra ASN Traffic QoS Marking Rules parameters of BS 66053, run the following command:

**npu# show ctrltrafficqos-intraasn bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ctrltrafficqos-intraasn bs**

| | |
|---|---|
| **Command Syntax** | **npu# show ctrltrafficqos-intraasn bs** [<(1 to 16777215 StepSize 1) |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Intra ASN Traffic QoS Marking Rules parameters of a specific BS. Do not specify a value for this parameter if you want to display the Intra ASN Traffic QoS Marking Rules parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                    :<value>
IntraASNDSCP                                      :<value>
IntraASN802.1pPriority                            :<value>
```

**Command Modes**

Global command mode

### 4.7.25.5.3 Displaying Configuration Information for All Control Traffic QoS Marking Rules Parameters

To display configuration for all Control Traffic QoS Marking Rules parameters, run the following command:

**npu# show ctrltrafficqos-all bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display all Control Traffic QoS Marking Rules parameters of BS 66053, run the following command:

**npu# show ctrltrafficqos-all bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ctrltrafficqos-all bs**

**Command Syntax**

**npu# show ctrltrafficqos-all bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display all Control Traffic QoS Marking Rules parameters of a specific BS. Do not specify a value for this parameter if you want to display all Control Traffic QoS Marking Rules parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
IntraASNDSCP                             :<value>
IntraASN802.1pPriority                   :<value>
InternalManagementDSCP                   :<value>
InternalManagement802.1pPriority         :<value>
```

**Command Modes**

Global command mode

## 4.7.26 Managing BS Management Alarm Thresholds Parameters

The Management Alarm Thresholds parameters enable configuring the alarm thresholds for control messages traffic. If the retransmission rate or the drop rate of control messages exceeds the applicable configurable threshold, an alarm will be generated.

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Management Alarm Threshold parameters (refer to Section 4.7.26.1).
- Restore the default values of some or all of the Management Alarm Threshold parameters (refer to Section 4.7.26.2).

You can display configuration for the Management Alarm Threshold parameters of a selected or all existing BSs (refer to Section 4.7.26.3).

### 4.7.26.1 Configuring Management Alarm Thresholds Parameters

**To configure the Management Alarm Thresholds parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# mngmnt-alrmthrshld** [retransmit-rate <(0 to 100 StepSize 1)> ] [drop-rate <(0 to 100 StepSize 1)> ]

| | |
|---|---|
| **Command Syntax** | `npu(config-bs-66053)# mngmnt-alrmthrshld [retransmit-rate <(0 to 100 StepSize 1)> ] [drop-rate <(0 to 100 StepSize 1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| retransmit-rate <(0 to 100 StepSize 1)> | Alarm Threshold for retransmission rate of control messages (in %). | Optional | 30 | 0-100 |
| drop-rate <(0 to 100 StepSize 1)> | Alarm Threshold for dropn rate of control messages (in %). | Optional | 10 | 0-100 |

**Command Modes** bs configuration mode

**IMPORTANT**

When creating a new BS, at least one of the Management Alarm Thresholds parameters must be configured explicitly (even if configured to the default value).

### 4.7.26.2 Restoring the Default Values of Management Alarm Thresholds Parametes

To restore the default values of some or all of the Management Alarm Thresholds parameters, run the following command:

**npu(config-bs-66053)# no mngmnt-alrmthrshld** [retransmit-rate ] [drop-rate ]

You can restore only one parameter to the default value by specifying only that parameter. For example, to restore only the drop-rate parameter to the default value, run the following command:

**npu(config-bs-66053)# no mngmnt-alrmthrshld drop-rate**

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Management Alarm Thresholds parameters to their default value, run the following command:

**npu(config-bs-66053)# no mngmnt-alrmthrshld**

**NOTE**

Refer to Section 4.7.26.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no mngmnt-alrmthrshld** `[retransmit-rate ] [drop-rate ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.26.3 Displaying Configuration Information for Management Alarm Thresholds Parameters

To display configuration information of Management Alarm Thresholds parameters, run the following command:

**npu# show mngmnt-alrmthrshld bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Management Alarm Thresholds parameters of BS 66053, run the following command:

**npu# show mngmnt-alrmthrshld bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show mngmnt-alrmthrshld bs**

**Command Syntax**

**npu# show mngmnt-alrmthrshld bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display Management Alarm Thresholds parameters of a specific BS. Do not specify a value for this parameter if you want to display Management Alarm Thresholds parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                              :<value>
ControlMessagesRetransmissionRateThreshold(%)        :<value>
ControlMessagesDropRateThreshold(%)                  :<value>
```

**Command Modes**

Global command mode

## 4.7.27 Managing ID-IP Mapping Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more ID-IP Mapping entry (refer to Section 4.7.27.1).
- Delete one or more ID-IP Mapping entries (refer to Section 4.7.27.2).

You can display configuration information for the ID-IP Mapping of a selected or all existing BSs (refer to Section 4.7.27.3).

### 4.7.27.1 Configuring ID-IP Mapping Entries

**To configure ID-IP Mapping entries:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)# idip** <(1 to 16777215 StepSize 1)> [nw-node-ip <ip address>]

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# idip** `<(1 to 16777215 StepSize 1)> [nw-node-ip <ip address> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The Next Hop (Network Node) BS ID | Mandatory | N/A | 1 - 16777215 |
| nw-node-ip <ip address> | The Next Hop (Network Node) BS IP Address | Mandatory | N/A | IP address |

**Command Modes** bs configuration mode

**IMPORTANT**

When creating a new BS, at least one ID-IP Mapping entry must be configured.

## 4.7.27.2 Deleting an ID-IP Mapping Entry

Run the following command from the BS configuration mode to delete an ID-IP Mapping entry:

**npu(config-bs 66053)# no idip** <(1 to 16777215 StepSize 1)>

**Command Syntax**

npu(config-bs 66053)# no idip <(1 to 16777215 StepSize 1)>

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The Next Hop (Network Node) BS ID | Mandatory | N/A | 1 - 16777215 |

**Command Modes**

bs configuration mode

## 4.7.27.3 Displaying Configuration Information for ID-IP Mapping Entries

To display configuration information of ID-IP Mapping entries, run the following command:

**npu# show idip bs** [<(1 to 16777215 StepSize 1)> nw-node-id <(1 to 16777215 StepSize 1)> ]

Specify the BS ID and Next Hop (Network Node) BS ID (nw-node-id) if you want to display information for a particular ID-IP Mapping entry. For example, to display the ID-IP Mapping of BS 66053 and Network Node 66055, run the following command:

**npu# show idip bs 66053 nw-node-id 66055**

Do not specify these parameters if you want to view information of ID-IP Mapping entries in all existing BSs. To display information for all BSs, run the following command:

**npu# show idip bs**

**Command Syntax**

**npu# show idip bs** [<(1 to 16777215 StepSize 1)> nw-node-id <(1 to 16777215 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to displayspecific ID-IP Mapping entry in a specific BS. Do not specify a value for this parameter if you want to display all ID-IP Mapping entries of all BSs. | Optional | N/A | 1-16777215 |
| nw-node-id <(1 to 16777215 StepSize 1)> | The Next Hop (Network Node) BS ID.<br>Specify a value for this parameter if you want to display a specific ID-IP Mapping entry in a specific BS. Do not specify a value for this parameter if you want to display all ID-IP Mapping entries of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each entry if requested for all)

```
BSIDLSB                    :<value>
NetworkNodeID              :<value>
NetworkNodeIPAddress       :<value>
```

| Command Modes | Global command mode |
|---|---|

## 4.7.28 Managing Ranging Parameters

**To configure the Ranging parameters:**

1. Enable the Ranging configuration mode (refer to Section 4.7.28.1)
2. You can now execute any of the following tasks:
   - Configure one or more of the Ranging parameters tables (refer to Section 4.7.28.2)
   - Restore the default values of parameters in one or more of the Ranging parameters tables (refer to Section 4.7.28.3)
   - Terminate the Ranging configuration mode (refer to Section 4.7.28.4)

In addition, you can, at any time, display configuration information for each of the parameters tables (refer to Section 4.7.28.5).

### 4.7.28.1 Enabling the Ranging Configuration Mode

To configure the Ranging parameters, first enable the Ranging configuration mode. Run the following command to enable the Ranging configuration mode.

Note that for properly completing the configuration the **apply** command must be executed prior to exiting the Ranging configuration mode.

**npu(config-bs-66053)# ranging**

The Ranging configuration mode is enabled, after which you can execute any of the following tasks:

- Configure one or more of the Ranging parameters tables (refer to Section 4.7.28.2)
- Restore the default values of parameters in one or more of the parameters tables (refer to Section 4.7.28.3)

After executing the above tasks, you can terminate the Ranging configuration mode (refer to Section 4.7.28.4) and return to the BS configuration mode.

Note that for properly completing the Ranging configuration the **apply** command must be executed prior to exiting the Ranging configuration mode.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# ranging** |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

## 4.7.28.2 Configuring Ranging Parameters

After enabling the Ranging configuration mode you can configure the following parameters tables:

- General (refer to Section 4.7.28.2.1)
- Bandwidth Request (refer to Section 4.7.28.2.2)
- Handover Ranging (refer to Section 4.7.28.2.3)
- Initial Ranging (refer to Section 4.7.28.2.4)
- Periodic Ranging (refer to Section 4.7.28.2.5)
- Timing Correction (refer to Section 4.7.28.2.6)

**IMPORTANT**

After completing the Ranging configuration,do not forget to execute the apply command before exiting the Ranging configuration mode:
**npu(config-bs-66053-ranging)# apply**

### 4.7.28.2.1 Configuring Ranging General Parameters

To configure the Ranging General parameters, run the following command:

**npu(config-bs-66053-ranging)# general** [start-of-rng-codes <(0 to 255 StepSize 1)> ] [contbased-rsrvtimeout <(0 to 255 StepSize 1)> ] [max-cellradius {one | two | four | eight | fifteen | twentyThree | thirty} ]

**IMPORTANT**

When creating a new BS, at least one of the Ranging General parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

**npu(config-bs-66053-ranging)#** `general [start-of-rng-codes <(0 to 255 StepSize 1)> ] [contbased-rsrvtimeout <(0 to 255 StepSize 1)> ] [max-cellradius {one | two | four | eight | fifteen | twentyThree | thirty} ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| start-of-rng-codes <(0 to 255 StepSize 1)> | Start of Ranging Codes: The starting number S of the group of codes used for this uplink<br><br>Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256. | Optional | 14 | 0 - 255 |
| contbased-rsrvtimeout <(0 to 255 StepSize 1)> | Contention-Based Reservation Timeout (in frames). The number of UL-MAPs to receive before contention-based reservation is attempted again for the same connection. | Optional | 5 | 0 - 255 |

| | | | | | |
|---|---|---|---|---|---|
| | max-cellradius {one \| two \| four \| eight \| fifteen \| twentyThree \| thirty} | The Maximum Cell Radius (in km) | Optional | two | ■ one<br>■ two<br>■ four<br>■ eight<br>■ fifteen<br>■ twentyThree<br>■ thirty |

**Command Modes**

bs ranging configuration mode

### 4.7.28.2.2 Configuring Ranging Bandwidth Request Parameters

To configure the Ranging Bandwidth Request parameters, run the following command:

**npu(config-bs-66053-ranging)# bwreq** [codes <(0 to 255 StepSize 1)> ] [init-backoff-window-size <(0 to 15 StepSize 1)> ] [final-backoff-window-size <(0 to 15 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Ranging Bandwidth Request parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

**npu(config-bs-66053-ranging)# bwreq** `[codes <(0 to 255 StepSize 1)> ] [init-backoff-window-size <(0 to 15 StepSize 1)> ] [final-backoff-window-size <(0 to 15 StepSize 1)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | codes <(0 to 255 StepSize 1)> | Number of Bandwidth Request Codes.<br>Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256. | Optional | 14 | 0 - 255 |
| | init-backoff-window-size <(0 to 15 StepSize 1)> | Initial backoff window size for contention BW requests; expressed as a power of 2. | Optional | 0 | 0 - 15 |
| | final-backoff-window-size <(0 to 15 StepSize 1)> | Final backoff window size for contention BW requests; expressed as a power of 2.<br>Cannot higher than or equal to bwreq init-backoff-window-size. | Optional | 4 | 0 - 15 |

| | |
|---|---|
| **Command Modes** | bs ranging configuration mode |

### 4.7.28.2.3 Configuring Handover Ranging Parameters

To configure the Handover Ranging parameters, run the following command:

**npu(config-bs-66053-ranging)# horng** [codes <(0 to 255 StepSize 1)> ] [init-backoff-window-size <(0 to 15 StepSize 1)> ] [final-backoff-window-size <(0 to 15 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Handover Ranging parameters must be configured explicitly (even if configured to the default value).

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# horng** `[codes <(0 to 255 StepSize 1)> ] [init-backoff-window-size <(0 to 15 StepSize 1)> ] [final-backoff-window-size <(0 to 15 StepSize 1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| codes <(0 to 255 StepSize 1)> | Number of Handover Ranging CDMA Codes.<br>Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256. | Optional | 14 | 0 - 255 |
| init-backoff-window-size <(0 to 15 StepSize 1)> | Initial backoff window size for handover ranging contention ; expressed as a power of 2. | Optional | 0 | 0 - 15 |
| final-backoff-window-size <(0 to 15 StepSize 1)> | Final backoff window size for handover ranging contention; expressed as a power of 2.<br>Cannot higher than or equal to horng init-backoff-window-size. | Optional | 4 | 0 - 15 |

**Command Modes**

bs ranging configuration mode

### 4.7.28.2.4 Configuring Initial Ranging Parameters

To configure the Initial Ranging parameters, run the following command:

**npu(config-bs-66053-ranging)# initrng** [codes <(0 to 255 StepSize 1)> ] [init-backoff-window-size <(0 to 15 StepSize 1)> ] [final-backoff-window-size <(0 to 15 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Initial Ranging parameters must be configured explicitly (even if configured to the default value).

**Command Syntax**

```
npu(config-bs-66053-ranging)# initrng [codes <(0 to 255 StepSize 1)> ]
[init-backoff-window-size <(0 to 15 StepSize 1)> ]
[final-backoff-window-size <(0 to 15 StepSize 1)> ]
```

| | |
|---|---|
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| codes <(0 to 255 StepSize 1)> | Number of Initial Ranging CDMA Codes.<br>Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256. | Optional | 14 | 0 - 255 |
| init-backoff-window-size <(0 to 15 StepSize 1)> | Initial backoff window size for initial ranging contention ; expressed as a power of 2. | Optional | 0 | 0 - 15 |
| final-backoff-window-size <(0 to 15 StepSize 1)> | Final backoff window size for initial ranging contention; expressed as a power of 2.<br>Cannot higher than or equal to initrng init-backoff-window-size. | Optional | 4 | 0 - 15 |

| | |
|---|---|
| **Command Modes** | bs ranging configuration mode |

### 4.7.28.2.5 Configuring Periodic Ranging Parameters

To configure the Periodic Ranging parameters, run the following command:

**npu(config-bs-66053-ranging)# periodicrng** [codes <(0 to 255 StepSize 1)> ] [init-backoff-window-size <(0 to 15 StepSize 1)> ] [final-backoff-window-size <(0 to 15 StepSize 1)> ]

**IMPORTANT**

When creating a new BS, at least one of the Periodic Ranging parameters must be configured explicitly (even if configured to the default value).

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# periodicrng** [codes <(0 to 255 StepSize 1)> ] [init-backoff-window-size <(0 to 15 StepSize 1)> ] [final-backoff-window-size <(0 to 15 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| codes <(0 to 255 StepSize 1)> | Number of Periodic Ranging CDMA Codes.<br>Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256. | Optional | 4 | 0 - 255 |
| init-backoff-window-size <(0 to 15 StepSize 1)> | Initial backoff window size for periodic ranging contention ; expressed as a power of 2. | Optional | 0 | 0 - 15 |
| final-backoff-window-size <(0 to 15 StepSize 1)> | Final backoff window size for periodic ranging contention; expressed as a power of 2.<br>Cannot higher than or equal to periodicrng init-backoff-window-size. | Optional | 4 | 0 - 15 |

| | |
|---|---|
| **Command Modes** | bs ranging configuration mode |

### 4.7.28.2.6 Configuring Ranging Timing Correction Parameters

To configure the Timing Correction parameters, run the following command:

**npu(config-bs-66053-ranging)# timingcorrection** [thrshld-correction <(0 to 250 StepSize 0.1)>] [thrshld-rngstatus <(0 to 250 StepSize 0.1)>]

**IMPORTANT**

When creating a new BS, at least one of the Timing Correction parameters must be configured explicitly (even if configured to the default value).

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# timingcorrection** `[thrshld-correction <(0 to 250 StepSize 0.1)> ] [thrshld-rngstatus <(0 to 250 StepSize 0.1)> ]` |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| thrshld-correction <(0 to 250 StepSize 0.1)> | Timing correction range threshold (in microseconds) below which corrections aren't made. | Optional | 1 | 0 - 250 in steps of 0.1 |
| thrshld-rngstatus <(0 to 250 StepSize 0.1)> | Timing correction range threshold (in microseconds) below which the ranging status is success and above which the ranging status is continue | Optional | 10 | 0 - 250 in steps of 0.1 |

**Command Modes** bs ranging configuration mode

### 4.7.28.3 Restoring Default Values for Ranging Configuration Parameters

After enabling the Ranging configuration mode you can restore the default values for parameters in the following parameters tables:

- General (refer to Section 4.7.28.3.1)
- Bandwidth Request (refer to Section 4.7.28.3.2)
- Handover Ranging (refer to Section 4.7.28.3.3)
- Initial Ranging (refer to Section 4.7.28.3.4)
- Periodic Ranging (refer to Section 4.7.28.3.5)
- Timing Correction (refer to Section 4.7.28.3.6)

### 4.7.28.3.1 Restoring the Default Values of Ranging General Parameters

To restore one or all of the Ranging General parameters to their default values, run the following command:

**npu(config-bs-66053-ranging)# no general** [start-of-rng-codes ] [contbased-rsrvtimeout ] [max-cellradius ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only max-cellradius to the default value, run the following command:

**npu(config-bs-66053-ranging)# no general max-cellradius**

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Ranging General parameters to their default value, run the following command:

**npu(config-bs-66053-ranging)# no general**

**NOTE**

Refer to Section 4.7.28.2.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# no general** `[start-of-rng-codes ] [contbased-rsrvtimeout ] [max-cellradius ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs ranging configuration mode |

### 4.7.28.3.2 Restoring the Default Values of Ranging Bandwidth Request Parameters

To restore one or all of the Ranging Bandwidth Request parameters to their default values, run the following command:

**npu(config-bs-66053-ranging)# no bwreq** [codes ] [init-backoff-window-size ] [final-backoff-window-size ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the codes parameter to the default value, run the following command:

**npu(config-bs-66053-ranging)# no bwreq codes**

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Ranging Bandwidth Request parameters to their default value, run the following command:

**npu(config-bs-66053-ranging)# no bwreq**

**NOTE**

Refer to Section 4.7.28.2.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# no bwreq** `[codes ] [init-backoff-window-size ] [final-backoff-window-size ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs ranging configuration mode |

### 4.7.28.3.3 Restoring the Default Values of Handover Ranging Parameters

To restore one or all of the Handover Ranging parameters to their default values, run the following command:

**npu(config-bs-66053-ranging)# no horng** [codes ] [init-backoff-window-size ] [final-backoff-window-size ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the codes parameter to the default value, run the following command:

**npu(config-bs-66053-ranging)# no horng codes**

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Handover Ranging parameters to their default value, run the following command:

**npu(config-bs-66053-ranging)# no horng**

**NOTE**

Refer to Section 4.7.28.2.3 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# no horng** `[codes ] [init-backoff-window-size ] [final-backoff-window-size ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs ranging configuration mode |

### 4.7.28.3.4 Restoring the Default Values of Initial Ranging Parameters

To restore one or all of the Initial Ranging parameters to their default values, run the following command:

**npu(config-bs-66053-ranging)# no initrng** [codes ] [init-backoff-window-size ] [final-backoff-window-size ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the codes parameter to the default value, run the following command:

**npu(config-bs-66053-ranging)# no initrng codes**

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Initial Ranging parameters to their default value, run the following command:

**npu(config-bs-66053-ranging)# no initrng**

**NOTE**

Refer to Section 4.7.28.2.4 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# no initrng** [codes ] [init-backoff-window-size ] [final-backoff-window-size ] |
| **Privilege Level** | 10 |
| **Command Modes** | bs ranging configuration mode |

### 4.7.28.3.5 Restoring the Default Values of Periodic Ranging Parameters

To restore one or all of the Periodic Ranging parameters to their default values, run the following command:

**npu(config-bs-66053-ranging)# no periodicrng** [codes ] [init-backoff-window-size ] [final-backoff-window-size ]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the codes parameter to the default value, run the following command:

**npu(config-bs-66053-ranging)# no periodicrng codes**

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Periodic Ranging parameters to their default value, run the following command:

**npu(config-bs-66053-ranging)# no periodicrng**

**NOTE**

Refer to Section 4.7.28.2.5 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# no periodicrng** [codes ] [init-backoff-window-size ] [final-backoff-window-size ] |
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | bs ranging configuration mode |

### 4.7.28.3.6 Restoring the Default Values of Ranging Timing Correction Parameters

To restore one or all of the Ranging Timing Correction parameters to their default values, run the following command:

**npu(config-bs-1-ranging)# no timingcorrection** [thrshld-correction ] [thrshld-rngstatus ]

You can restore only one parameter to the default values by specifying only that parameters. For example, to restore only the thrshld-correction parameter to the default value, run the following command:

**npu(config-bs-66053-ranging)# no timingcorrection thrshld-correction**

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Ranging Timing Correction parameters to their default value, run the following command:

**npu(config-bs-66053-ranging)# no timingcorrection**

**NOTE**

Refer to Section 4.7.28.2.6 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-1-ranging)# no timingcorrection** `[thrshld-correction ] [thrshld-rngstatus ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs ranging configuration mode |

## 4.7.28.4 Terminating the Ranging Configuration Mode

Run the following command to terminate the Ranging configuration mode:

**npu(config-bs-66053-ranging)# exit**

**IMPORTANT**

Do not forget to execute the apply command before terminating the CRanging configuration mode:
**npu(config-bs-66053-ranging)# apply**

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053-ranging)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | bs ranging configuration mode |

## 4.7.28.5 Displaying Configuration Information for Ranging Parameters

You can display the current configuration information for the following parameters tables:

- General (refer to Section 4.7.28.5.1)
- Bandwidth Request (refer to Section 4.7.28.5.2)
- Handover Ranging (refer to Section 4.7.28.5.3)
- Initial Ranging (refer to Section 4.7.28.5.4)
- Periodic Ranging (refer to Section 4.7.28.5.5)
- Timing Correction (refer to Section 4.7.28.5.6)
- All (refer to Section 4.7.28.5.7)

### 4.7.28.5.1 Displaying Configuration Information for Ranging General Parameters

To display configuration for the Ranging General parameters, run the following command:

**npu# show ranging-general bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Ranging General parameters of BS 66053, run the following command:

**npu# show ranging-general bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ranging-general bs**

**Command Syntax**

**npu# show ranging-general bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Ranging General parameters of a specific BS. Do not specify a value for this parameter if you want to display the Ranging General parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
StartofRangingCodes                              :<value>
Contention-BasedReservationTimeout(frames)       :<value>
MaximumCellRadius(km)                            :<value>
```

**Command Modes**

Global command mode

### 4.7.28.5.2 Displaying Configuration Information for Ranging Bandwidth Request Parameters

To display configuration for the Ranging Bandwidth Request parameters, run the following command:

**npu# show ranging-bwreq bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Ranging Bandwidth Request parameters of BS 66053, run the following command:

**npu# show ranging-bwreq bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ranging-bwreq bs**

**Command Syntax**

**npu# show ranging-bwreq bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Ranging Bandwidth Request parameters of a specific BS. Do not specify a value for this parameter if you want to display the Ranging Bandwidth Request parameters of all BSs. | Optional | N/A | 1-16777215 |

| | |
|---|---|
| **Display Format** (for each existing BS if requested for all BSs) | `BSIDLSB :<value>`<br>`NumberofBandwidthRequestCodes :<value>`<br>`InitialBackoffWindowSizeforBandwidthRequest :<value>`<br>`FinalBackoffWindowSizeforBandwidthRequest :<value>` |
| **Command Modes** | Global command mode |

### 4.7.28.5.3 Displaying Configuration Information for Handover Ranging Parameters

To display configuration for the Handover Ranging parameters, run the following command:

**npu# show ranging-horng bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Handover Ranging parameters of BS 66053, run the following command:

**npu# show ranging-horng bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ranging-horng bs**

| | |
|---|---|
| **Command Syntax** | **npu# show ranging-horng bs** [<(1 to 16777215 StepSize 1) |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Handover Ranging parameters of a specific BS. Do not specify a value for this parameter if you want to display the Handover Ranging parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
NumberofHandoverRangingCodes                     :<value>
InitialBackoffWindowSizeforHandoverRanging       :<value>
FinalBackoffWindowSizeforHandoverRanging         :<value>
```

**Command Modes**

Global command mode

### 4.7.28.5.4 Displaying Configuration Information for Initial Ranging Parameters

To display configuration for the Initial Ranging parameters, run the following command:

**npu# show ranging-initrng bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Initial Ranging parameters of BS 66053, run the following command:

**npu# show ranging-initrng bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ranging-initrng bs**

**Command Syntax**

**npu# show ranging-initrng bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Initial Ranging parameters of a specific BS. Do not specify a value for this parameter if you want to display the Initial Ranging parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
NumberofInitialRangingCodes                      :<value>
InitialBackoffWindowSizeforInitialRanging        :<value>
FinalBackoffWindowSizeforInitialRanging          :<value>
```

**Command Modes**

Global command mode

### 4.7.28.5.5 Displaying Configuration Information for Periodic Ranging Parameters

To display configuration for the Periodic Ranging parameters, run the following command:

**npu# show ranging-periodicrng bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Periodic Ranging parameters of BS 66053, run the following command:

**npu# show ranging-periodicrng bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ranging-periodicrng bs**

**Command Syntax**

**npu# show ranging-periodicrng bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Periodic Ranging parameters of a specific BS. Do not specify a value for this parameter if you want to display the Periodic Ranging parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
NumberofPeriodicRangingCodes                     :<value>
InitialBackoffWindowSizeforPeriodicRanging       :<value>
FinalBackoffWindowSizeforPeriodicRanging         :<value>
```

**Command Modes**

Global command mode

### 4.7.28.5.6 Displaying Configuration Information for Ranging Timing Correction Parameters

To display configuration for the Ranging Timing Correction parameters, run the following command:

**npu# show ranging-timingcorrection bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Ranging Timing Correction parameters of BS 66053, run the following command:

**npu# show ranging-timingcorrection bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ranging-timingcorrection bs**

**Command Syntax**

**npu# show ranging-timingcorrection bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display the Ranging Timing Correction parameters of a specific BS. Do not specify a value for this parameter if you want to display the Ranging Timing Correction parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                                :<value>
ThresholdforRangingTimingCorrections(microseconds):<value>
ThresholdforRangingStatus(microseconds)           :<value>
```

**Command Modes**

Global command mode

#### 4.7.28.5.7 Displaying Configuration Information for All Ranging Parameters

To display configuration for all Ranging parameters, run the following command:

**npu# show ranging-all bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display all Ranging parameters of BS 66053, run the following command:

**npu# show ranging-all bs 66053**

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

**npu# show ranging-all bs**

**Command Syntax**

**npu# show ranging-all bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br>Specify a value for this parameter if you want to display all Ranging parameters of a specific BS. Do not specify a value for this parameter if you want to display all Ranging parameters of all BSs. | Optional | N/A | 1-16777215 |

**Command Modes**

Global command mode

## 4.7.29 Managing Alarm Threshold Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Alarm Threshold parameters (refer to Section 4.7.29.1).
- Restore the default values of some or all of the Alarm Threshold parameters (refer to Section 4.7.29.2).

You can display configuration and status information for the Alarm Threshold parameters of a selected or all existing BSs (refer to Section 4.7.29.3).

### 4.7.29.1 Configuring Alarm Threshold Parameters

**To configure the Alarm Threshold parameters:**

From the BS configuration mode, run the following command:

**npu(config-bs-66053)#** alrm-thrshld [dl-droppedpackets <(1 to 1000 StepSize 1)> ] [unalloc-slots <(1 to 100 StepSize 1)> ] [dl-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)> ] [ul-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)> ] [dl-subburstdrop <(0 to 100 StepSize 0.01)> ] [ul-subburstdrop <(0 to 100 StepSize 0.01)> ] [ul-mednoise <(-130 to 0 StepSize 1)> ] [ul-99prcntnoise <(-130 to 0 StepSize 1)> ]

**Command Syntax**

**npu(config-bs-66053)#** `alrm-thrshld [dl-droppedpackets <(1 to 1000 StepSize 1)> ] [unalloc-slots <(1 to 100 StepSize 1)> ] [dl-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)> ] [ul-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)> ] [dl-subburstdrop <(0 to 100 StepSize 0.01)> ] [ul-subburstdrop <(0 to 100 StepSize 0.01)> ] [ul-mednoise <(-130 to 0 StepSize 1)> ] [ul-99prcntnoise <(-130 to 0 StepSize 1)> ]`

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| dl-droppedpackets <(1 to 1000 StepSize 1)> | Downlink Dropped Packets Ratio. Threshold for excessive DL dropped packets ratio - all services alarm (in promils). | Optional | 1000 | 1 - 1000 |

| | | | | |
|---|---|---|---|---|
| unalloc-slots <(1 to 100 StepSize 1)> | Unallocated Slots Ratio. Alarm threshold for an excessive ratio of unallocated slots versus total number of slots (in percents), due to lack of space in map. | Optional | 100 | 1 - 100 |
| dl-retransmissions <(-1 to -1 StepSize 1) \| (1 to 10 StepSize 0.1)> | Downlink Retransmissions. Threshold for excessive downlink retransmissions (total transmissions/total transactions) alarm. A value of -1 means the alarm is disabled. | Optional | -1 | -1 or 1 to 10 in steps of 0.1 |
| ul-retransmissions <(-1 to -1 StepSize 1) \| (1 to 10 StepSize 0.1)> | Uplink Retransmissions. Threshold for excessive uplink retransmissions (total transmissions/total transactions) alarm. A value of -1 means the alarm is disabled. | Optional | -1 | -1 or 1 to 10 in steps of 0.1 |
| dl-subburstdrop <(0 to 100 StepSize 0.01)> | Downlink Sub-Burst Drop Rate. Threshold for excessive downlink HARQ sub-burst drop rate alarm (in percents). | Optional | 100 | 0 to 100 in steps of 0.01 |
| ul-subburstdrop <(0 to 100 StepSize 0.01)> | Uplink Sub-Burst Drop Rate. Threshold for excessive uplink HARQ sub-burst drop rate alarm (in percents). | Optional | 100 | 0 to 100 in steps of 0.01 |
| ul-mednoise <(-130 to 0 StepSize 1)> | Uplink Median Noise. Threshold for excessive uplink median noise alarm (in dBm). | Optional | 0 | -130 to 0 |
| ul-99prcntnoise <(-130 to 0 StepSize 1)> | Uplink 99% Percentile Noise.Threshold for excessive UL 99% percentile noise alarm (in dBm). | Optional | 0 | -130 to 0 |

**Command Modes** bs configuration mode

**IMPORTANT**

When creating a new BS, at least one of the Alarm Threshold parameters must be configured explicitly (even if configured to the default value).

### 4.7.29.2 Restoring the Default Values of Alarm Threshold Parametes

To restore the default values of some or all of the Alarm Threshold parameters, run the following command:

**npu(config-bs-66053)# no alrm-thrshld** [dl-droppedpackets] [unalloc-slots] [dl-retransmissions] [ul-retransmissions] [dl-subburstdrop] [ul-subburstdrop] [ul-mednoise] [ul-99prcntnoise]

You can restore only some parameters to the default values by specifying only those parameter. For example, to restore only the dl-droppedpackets parameter to the default value, run the following command:

**npu(config-bs-66053)# no alrm-thrshld dl-droppedpackets**

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Alarm Threshold parameters to their default value, run the following command:

**npu(config-bs-66053)# no alrm-thrshld**

**NOTE**

Refer to Section 4.7.29.1 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-bs-66053)# no alrm-thrshld** `[dl-droppedpackets ] [unalloc-slots ] [dl-retransmissions ] [ul-retransmissions ] [dl-subburstdrop ] [ul-subburstdrop ] [ul-mednoise ] [ul-99prcntnoise ]` |
| **Privilege Level** | 10 |
| **Command Modes** | bs configuration mode |

### 4.7.29.3 Displaying Configuration Information for Alarm Threshold Parameters

To display configuration information of Alarm Threshold parameters, run the following command:

**npu# show alrm-thrshld bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Alarm Threshold parameters of BS 66053, run the following command:

**npu# show alrm-thrshld bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show alrm-thrshld bs**

**Command Syntax**

**npu# show alrm-thrshld bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display Alarm Threshold parameters of a specific BS. Do not specify a value for this parameter if you want to display Alarm Threshold parameters of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
DownlinkDroppedPacketsRatio(promil)              :<value>
UnallocatedSlotsRatio                            :<value>
DownlinkRetransmissions(-1meansdisable)          :<value>
UplinkRetransmissions(-1meansdisable)            :<value>
DownlinkSub-BurstDropRate(%)                     :<value>
UplinkSub-BurstDropRate(%)                       :<value>
UplinkSub-BurstDropRate(%)                       :<value>
Uplink99%Noise(dBm)                              :<value>
```

**Command Modes**

Global command mode

## 4.7.30 Displaying Status Information for HARQ Maximum Retransmissions Parameter

**To be moved to 4.9????**

The HARQ Maximum Retransmissions is the maximal number of retransmissions of an uplink HARQ sub-burst.

To display status information of HARQ Maximum Retransmissions parameter, run the following command:

**npu# show harq bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the HARQ Maximum Retransmissions parameter of BS 66053, run the following command:

**npu# show harq bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show harq bs**

**Command Syntax**

**npu# show harq bs** [<(1 to 16777215 StepSize 1)

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the HARQ Maximum Retransmissions parameter of a specific BS. Do not specify a value for this parameter if you want to display the HARQ Maximum Retransmissions Pparameter of all BSs. | Optional | N/A | 1-16777215 |

**Display Format**

(for each existing BS if requested for all BSs)

```
BSIDLSB                                    :<value>
MaximumRetransmissions                     :<value>
```

**Command Modes**

Global command mode

## 4.7.31 Managing BS Reserved Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the BS Reserved parameters (refer to Section 4.7.31.1).
- Restore the default values of some or all of the BS Reserved parameters (refer to Section 4.7.31.2).

You can display configuration information for the BS Reserved parameters of a selected or all existing BSs (refer to Section 4.7.31.3).

### 4.7.31.1 Configuring BS Reserved Parameters

As the name implies, the reserved parameters table enables configuring up to 21 parameters that are reserved for possible future use. In the current release none of the reserved parameters is being used.

To configure the BS reserved parameters, run the following command:

**npu(config-bs-66053-1)# bs-reserved** [reserved-1 <string (32)> ] [reserved-2 <string (32)> ] [reserved-3 <string (32)> ] [reserved-4 <string (32)> ] [reserved-5 <string (32)> ] [reserved-6 <string (32)> ] [reserved-7 <string (32)> ] [reserved-8 <string (32)> ] [reserved-9 <string (32)> ] [reserved-10 <string (32)> ] [reserved-11 <string (32)> ] [reserved-12 <string (32)> ] [reserved-13 <string (32)> ] [reserved-14 <string (32)> ] [reserved-15 <string (32)> ] [reserved-16 <string (32)> ] [reserved-17 <string (32)> ] [reserved-18 <string (32)> ] [reserved-19 <string (32)> ] [reserved-20 <string (32)> ] [reserved-21 <string (32)> ]

**Command Syntax**

**npu (config-bs-66053)# bs-reserved** [reserved-1 <string (32)> ] [reserved-2 <string (32)> ] [reserved-3 <string (32)> ] [reserved-4 <string (32)> ] [reserved-5 <string (32)> ] [reserved-6 <string (32)> ] [reserved-7 <string (32)> ] [reserved-8 <string (32)> ] [reserved-9 <string (32)> ] [reserved-10 <string (32)> ] [reserved-11 <string (32)> ] [reserved-12 <string (32)> ] [reserved-13 <string (32)> ] [reserved-14 <string (32)> ] [reserved-15 <string (32)> ] [reserved-16 <string (32)> ] [reserved-17 <string (32)> ] [reserved-18 <string (32)> ] [reserved-19 <string (32)> ] [reserved-20 <string (32)> ] [reserved-21 <string (32)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [reserved-N <string (32)>] (N=1-21) | Reserved parameter number N | Optional | null (an empty string) | A string of 32 printable characters. |

| Command Modes | bs configuration mode |
|---|---|

**IMPORTANT**

When creating a new BS, at least one of the BS Reserved parameters must be configured explicitly (even if configured to the default value).

### 4.7.31.2 Restoring the Default Values of BS Reserved Parametes

To restore the default values of some or all of the BS Reserved parameters, run the following command:

**npu(config-bs-66053)# no bs-reserved** [reserved-1 ] [reserved-2 ] [reserved-3 ] [reserved-4 ] [reserved-5 ] [reserved-6 ] [reserved-7 ] [reserved-8 ] [reserved-9 ] [reserved-10 ] [reserved-11 ] [reserved-12 ] [reserved-13 ] [reserved-14 ] [reserved-15 ] [reserved-16 ] [reserved-17 ] [reserved-18 ] [reserved-19 ] [reserved-20 ] [reserved-21 ]

You can restore only some parameters to the default values by specifying only those parameter. For example, to restore only the reserved-1 and reserved-2 parameters to the default values, run the following command:

**npu(config-bs-66053)# no bs-reserved reserved-1 reserved-2**

These parameters will be restored to the default value, while the other parameters will remain unchanged.

To restore all BS Reserved parameters to their default value, run the following command:

**npu(config-bs-66053)# no bs-reserved**

**NOTE**

Refer to Section 4.7.31.1 for a description and default values of these parameters.

| Command Syntax | **npu(config-bs-66053)# no bs-reserved** [reserved-1 ] [reserved-2 ] [reserved-3 ] [reserved-4 ] [reserved-5 ] [reserved-6 ] [reserved-7 ] [reserved-8 ] [reserved-9 ] [reserved-10 ] [reserved-11 ] [reserved-12 ] [reserved-13 ] [reserved-14 ] [reserved-15 ] [reserved-16 ] [reserved-17 ] [reserved-18 ] [reserved-19 ] [reserved-20 ] [reserved-21 ] |
|---|---|

| | |
|---|---|
| **Privilege Level** | 10 |

| | |
|---|---|
| **Command Modes** | bs configuration mode |

### 4.7.31.3 Displaying Configuration Information for BS Reserved Parameters

To display configuration information of BS Reserved parameters, run the following command:

**npu# show bs-reserved bs** [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the BS Reserved parameters of BS 66053, run the following command:

**npu# show bs-reserved bs 66053**

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

**npu# show bs-reserved bs**

| | |
|---|---|
| **Command Syntax** | **npu# show bs-reserved bs** [<(1 to 16777215 StepSize 1) |

| | |
|---|---|
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | The BS ID<br><br>Specify a value for this parameter if you want to display the Reserved parameters of a specific BS. Do not specify a value for this parameter if you want to display the Reserved parameters of all BSs. | Optional | N/A | 1-16777215 |

| | | |
|---|---|---|
| **Display Format**<br>(for each existing BS if requested for all BSs) | BSIDLSB | :<value> |
| | ReservedParameter1 | :<value> |
| | ReservedParameter2 | :<value> |
| | ReservedParameter3 | :<value> |
| | ReservedParameter4 | :<value> |
| | ReservedParameter5 | :<value> |
| | ReservedParameter6 | :<value> |
| | ReservedParameter7 | :<value> |
| | ReservedParameter8 | :<value> |
| | ReservedParameter9 | :<value> |
| | ReservedParameter10 | :<value> |
| | ReservedParameter11 | :<value> |
| | ReservedParameter12 | :<value> |
| | ReservedParameter13 | :<value> |
| | ReservedParameter14 | :<value> |
| | ReservedParameter15 | :<value> |
| | ReservedParameter16 | :<value> |
| | ReservedParameter17 | :<value> |
| | ReservedParameter18 | :<value> |
| | ReservedParameter19 | :<value> |
| | ReservedParameter20 | :<value> |
| | ReservedParameter21 | :<value> |

| | |
|---|---|
| **Command Modes** | Global command mode |

# 4.8 Managing Sectors

Up to 6 Sector objects can be created and configured. The Sector's configuration includes the association of all the objects that form a sector, including BS, AU/AU-Port, ODU/ODU-Port and Antenna/Antenna Port.

This section include:

- "Configuring Sector Parameters", Section 4.8.1
- "Configuring Sector Association Entries", Section 4.8.2

## 4.8.1 Configuring Sector Parameters

**To configure Sector Parameters:**

1. Enable the Sector Parameters configuration mode for the selected Sector (refer to Section 4.8.1.1)
2. You can now execute any of the following tasks:
   - » Configure one or more of the parameters tables of the Sector (refer to Section 4.8.1.2)
   - » Restore the default values of parameters in one or more of the parameters tables of the Sector (refer to Section 4.8.1.3)
3. Terminate the Sector Parameters configuration mode (refer to Section 4.8.1.4)

In addition, you can, at any time, display configuration information for each of the parameters tables of the Sector (refer to Section 4.8.1.6) or delete an existing Sector object (refer to Section 4.8.1.5).

### 4.8.1.1 Enabling the Sector Parameters Configuration Mode\Creating a Sector Object

To configure the parameters of a Sector, first enable the Sector Parameters configuration mode for the specific Sector. Run the following command to enable the Sector Parameters configuration mode for an existing Sector object:

**npu (config)# sector-params** <(1 to 6 StepSize 1)>

To create a new Sector object, the mandatory heading and width parameters must be specified. Run the following command to create a new Sector object and enable the parameters configuration mode for this ODU:

**npu (config)# sector-params** <(1 to 6 StepSize 1)> [**heading** <(0 to 359 StepSize 1)> **width** <(0 to 359 StepSize 1)> ]

A new Sector object is created with default values for all parameters except to the mandatory heading and width parameters.

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

For example, to create Sector 1 object and enable the parameters configuration mode for this Sector, where the heading is 180 and width is 90, run the following command:

**npu (config)# sector-params 1 heading 180 width 90**

After enabling the Sector Parameters configuration mode for a Sector you can execute any of the following tasks:

- Configure one or more of the parameters tables of the Sector (refer to Section 4.8.1.2)
- Restore the default values of non-mandatory parameters in one or more of the parameters tables of the Sector (refer to Section 4.8.1.3)

After executing the above tasks, you can terminate the Sector Parameters configuration mode (refer to Section 4.8.1.4) and return to the global configuration mode.

| | |
|---|---|
| **Command Syntax** | **npu (config)# sector-params** <(1 to 6 StepSize 1)> [heading <(0 to 359 StepSize 1)> width <(0 to 359 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 6 StepSize 1)> | The Sector ID | Mandatory | N/A | 1-6 |
| heading <(0 to 359 StepSize 1)> | The sector heading (The center angle of the sector), in degrees. | Mandatory when creating a new Sector | N/A | 0 - 359 |
| width <(0 to 359 StepSize 1)> | The planned sector coverage, in degrees. | Mandatory when creating a new Sector | N/A | 0 - 359 |

**Command Modes**

Global configuration mode

**NOTE**

The following examples are for sector-1 parameters configuration mode.

## 4.8.1.2 Configuring Sector Parameters

After enabling the Sector Parameters configuration mode you can configure the following parameters tables:

- Sector Definition (refer to Section 4.8.1.2.1)
- Sector Reserved (refer to Section 4.8.1.2.2)

### 4.8.1.2.1 Configuring Sector Definition Parameters

The Sector Definition table enables configuring the main properties of the Sector.

To configure the Sector Definition parameters, run the following command:

**npu(config-sector-params-1)# sector-definition** [sector-name <string (32)> ] [heading <(0 to 359 StepSize 1)> ] [width <(0 to 359 StepSize 1)> ]

**IMPORTANT**

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

**Command Syntax**

**npu(config-sector-params-1)# sector-definition** [sector-name <string (32)> ] [heading <(0 to 359 StepSize 1)> ] [width <(0 to 359 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| sector-name <string (32)> | The sector name (description). Must be unique in the site (shelf). | Optional | null (empty string) | A string of up to 32 characters |
| heading <(0 to 359 StepSize 1)> | The sector heading (The center angle of the sector), in degrees.<br>The heading of an associated Sector cannot be changed. | Optional | Configured previously | 0 - 359 |
| width <(0 to 359 StepSize 1)> | The planned sector coverage, in degrees. | Optional | Configured previously | 0 - 359 |

**Command Modes**

sector-params configuration mode

### 4.8.1.2.2 Configuring Sector Reserved Parameters

As the name implies, the reserved parameters table enables configuring up to 4 parameters that are reserved for possible future use. In the current release none of the reserved parameters is being used.

To configure the Sector Reserved parameters, run the following command:

**npu(config-sector-params-1)# sector-reserved** [reserved-1 <string (32)>] [reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4 <string (32)>].

**Command Syntax**

**npu (config-sector-params-1)# sector-reserved** [reserved-1 <string (32)>] [reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4 <string (32)>]

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [reserved-N <string (32)>] (N=1-4) | Reserved parameter number N | Optional | null (an empty string) | A string of 32 printable characters. |

**Command Modes** sector-params configuration mode

## 4.8.1.3 Restoring Default Values for Sector Configuration Parameters

After enabling the Sector Parameters configuration mode you can restore the default values for parameters in the following parameters tables:

- Sector Definition (refer to Section 4.8.1.3.1)
- Sector Reserved (refer to Section 4.8.1.3.2)

### 4.8.1.3.1 Restoring the Default Values of Sector Definition Parameters

To restore the non-mandatory sector-name parameter to the default value, run the following command:

**npu(config-sector-params-1)# no sector-definition** [sector-name]

Since there is only one non-mandatory parameters, you can use any one of the following two commands to restore the sector-name to its default value:

**npu(config-sector-params-1)# no sector-definition**

or:

**npu(config-sector-params-1)# no sector-definition sector-name**

**NOTE**

Refer to Section 4.8.1.2.1 for a description and default values of this parameter.

| | |
|---|---|
| **Command Syntax** | **npu(config-sector-params-1)# no sector-definition** [sector-name] |
| **Privilege Level** | 10 |
| **Command Modes** | sector-params configuration mode |

#### 4.8.1.3.2 Restoring the Default Values of Sector Reserved Parameters

To restore Sector Reserved parameters to their default value, run the following command:

**npu(config-sector-params-1)# no sector-reserved** [reserved-1] [reserved-2] [reserved-3] [reserved-4]

You can restore only selected parameters to their default value by specifying only those parameter. For example, to restore only the reserved-1 parameter to its default values, run the following command:

**npu(config-sector-params-1)# no sector-reserved reserved-1**

This parameter will be restored to the default value, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

**npu(config-sector-params-1)# no sector-reserved**

**NOTE**

Refer to Section 4.8.1.2.2 for a description and default values of these parameters.

| | |
|---|---|
| **Command Syntax** | **npu(config-sector-params-1)# no sector-reserved** [reserved-1] [reserved-2] [reserved-3] [reserved-4] |
| **Privilege Level** | 10 |
| **Command Modes** | sector-params configuration mode |

### 4.8.1.4 Terminating the Sector Parameters Configuration Mode

Run the following command to terminate the Sector Parameters configuration mode:

**npu(config-sector-params-1)# exit**

| | |
|---|---|
| **Command Syntax** | **npu(config-sector-params-1)# exit** |
| **Privilege Level** | 10 |
| **Command Modes** | sector-params configuration mode |

### 4.8.1.5 Deleting a Sector Object

Run the following command to delete a Sector object:

**npu(config)# no sector-params** <(1 to 6 StepSize 1)>

**IMPORTANT**

An associated Sector (specified in a Sector Association) cannot be deleted.

| | |
|---|---|
| **Command Syntax** | **npu(config)# no sector-params** <(1 to 6 StepSize 1)> |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 6 StepSize 1)> | The Sector ID | Mandatory | N/A | 1-6 |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

## 4.8.1.6 Displaying Configuration Information for Sector Parameters

You can display the current configuration and (where applicable) additional status information for the following parameters tables:

- Sector Definition (refer to Section 4.8.1.6.1)
- Sector Reserved (refer to Section 4.8.1.6.2)

### 4.8.1.6.1 Displaying Configuration Information for Sector Definition Parameters

To display configuration information for the Sector Definition parameters of a specific or all Sector objects , run the following command:

**npu# show sector-definition** [sector-id <(1 to 6 StepSize 1)> ]

Specify the Sector ID (1-6) if you want to display configuration information for a particular Sector. Do not specify a value for this parameter if you want to view configuration information for all existing Sector objects.

**Command Syntax**

**npu# show sector-definition** [sector-id <(1 to 6 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| sector-id <(1 to 6 StepSize 1)> | The Sector ID<br><br>Specify a value for this parameter if you want to display the Sector Definition parameters of a specific Sector. Do not specify a value for this parameter if you want to display the parameters of all Sectors. | Optional | N/A | 1-6 |

| | |
|---|---|
| **Display Format**<br>(for each existing ODU object if requested for all ODUs) | `SectorID :<value>`<br>`SectorName :<value>`<br>`SectorHeading(degrees) :<value>`<br>`SectorWidth(degrees) :<value>` |
| **Command Modes** | Global command mode |

### 4.8.1.6.2 Displaying Configuration Information for Sector Reserved Parameters

To display configuration information for the reserved parameters of a specific or all Sector objects , run the following command:

**npu# show sector-reserved** [sector-id <(1 to 6 StepSize 1)> ]

Specify the Sector ID (1-6) if you want to display configuration for a particular Sector. Do not specify a value for this parameter if you want to view configuration for all existing Sector objects.

| | |
|---|---|
| **Command Syntax** | npu# show sector-reserved [sector-id <(1 to 6 StepSize 1)> ] |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 6 StepSize 1)> | The Sector ID.<br>Specify a value for this parameter if you want to display the reserved parameters of a specific Sector. Do not specify a value for this parameter if you want to display the reserved parameters of all Sectors. | Optional | N/A | 1-6 |

| | | |
|---|---|---|
| **Display Format** (for each existing ODU object if requested for all ODUs) | SectorID | :<value> |
| | ReservedParameter1 | :<value> |
| | ReservedParameter2 | :<value> |
| | ReservedParameter3 | :<value> |
| | ReservedParameter4 | :<value> |

| | |
|---|---|
| **Command Modes** | Global command mode |

## 4.8.2 Configuring Sector Association Entries

The Sector Association entry defines all the components that together form a Sector. Because of the unique functionality of Sector Association entries, they can only be created: An existing Sector Association entry cannot be modified (to modify an entry, it must first be deleted and then created again with the modified values). For details on creating a new Sector Association entry, refer to Section 4.8.2.1.

You can, at any time, display configuration information for each or all of the Sector Association entries (refer to Section 4.8.2.3) or delete an existing Sector Association entry (refer to Section 4.8.2.2).

### 4.8.2.1 Creating a Sector Association Entry

A Sector Association entry is identified by the BS ID, AU Slot ID and AU Port Number.

To create a new Sector Association entry, all the entry's parameters must be specified. Run the following command to create a new Sector Association entry:

**npu (config)# sector-assoc** <(1 to 16777215 StepSize 1)> <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> <(1 to 4 StepSize 1)> sector-id <(1 to 6 StepSize 1)> odu-no <(1 to 28 StepSize 1)> antenna-no <(1 to 28 StepSize 1)> odu-port-no <1 to 4 StepSize 1> antenna-port-no <1 to 8 StepSize 1>

A new Sector Association entry is created with the specified values. For example, to create a Sector Association entry identified by BS ID 66053, AU Slot No. 2 and AU Port No. and with association to Sector ID 3, ODU No. 4, Antenna No. 5, ODU Port No. 1 and Antenna Port No. 1, run the following command:

**npu (config)# sector-assoc 66053 2 1 sector-id 3 odu-no 4 antenna-no 5 odu-port-no 1 antenna-port-no 1**

**Command Syntax**

**npu (config)# sector-assoc** <(1 to 16777215 StepSize 1)> <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> <(1 to 4 StepSize 1)> sector-id <(1 to 6 StepSize 1)> odu-no <(1 to 28 StepSize 1)> antenna-no <(1 to 28 StepSize 1)> odu-port-no <1 to 4 StepSize 1> antenna-port-no <1 to 8 StepSize 1>

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | BS ID (bs-id-lsb) | Mandatory | N/A | 1-16777215 |
| <(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)> | AU Slot ID | Mandatory | N/A | 1-4, 7-9 |
| <(1 to 4 StepSize 1)> | AU Port Number | Mandatory | N/A | 1-4 |
| sector-id <(1 to 6 StepSize 1)> | Sector ID | Mandatory | N/A | 1-6 |
| odu-no <(1 to 28 StepSize 1)> | ODU Number | Mandatory | N/A | 1-28 |
| antenna-no <(1 to 28 StepSize 1)> | Antenna Number | Mandatory | N/A | 1-28 |
| odu-port-no <1 to 4 StepSize 1> | ODU Port Number | Mandatory | N/A | 1-4 |
| antenna-port-no <1 to 8 StepSize 1> | Antenna Port Number | Mandatory | N/A | 1-4 |

**Command Modes**

Global configuration mode

Creation of a new Sector Association entry will succeed only if all the following conditions are met:

- The specified BS object exists and is properly configured (see also Section 4.7):
  - » All mandatory parameters have been configured properly.

- The configured frequency is within the valid range defined by the required ODU type in the specified ODU object and the bandwidth parameter.
- The Operator ID is the same as Operator ID configured for previously associated BSs.
- In all tables that includes only non-mandatory parameters at least one parameter has been configured.
- Wherever needed, the apply command has been executed.

- The specified AU object exists (see Section 4.4).
- The specified ODU object exists (the mandatory parameters required-type and txpower for port 1 have been configured). The configured txpower is within the valid range for the required ODU type (see Section 4.5).
- The Antenna object exists (the mandatory heading parameter has been configured). The specified Antenna Port No. is within the range defined by the no-of-ports parameter (see Section 4.6).
- The Sector object exists (mandatory parameters have been configured). The defined sector-name is unique in the site (shelf). The configured Sector heading is the same as the heading configured for the specified Antenna(s) associated with it (see Section 4.8.1).
- An ODU Port (combination of ODU No. and ODU Port No.) cannot appear in more then one entry.
- An AU Port (combination of AU Slot No. and AU Port No.) cannot appear in more then one entry.
- An Antenna Port (combination of Antenna No. and Antenna Port No.) cannot appear in more then one entry.
- A specific Antenna can only be associated with a single Sector.
- In the current release, a specific BS can only be associated with a single AU, and vice versa (If BS 66053 is associated with AU 1, BS 66053 cannot be associated with another AU, and AU 1 cannot be associated with another BS).

### 4.8.2.2 Deleting a Sector Association Entry

Run the following command to delete a Sector Association entry:

**npu (config)# no sector-assoc** <(1 to 16777215 StepSize 1)> <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> <(1 to 4 StepSize 1)>

**Command Syntax**

**npu (config)# no sector-assoc** <(1 to 16777215 StepSize 1)> <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> <(1 to 4 StepSize 1)>

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <(1 to 16777215 StepSize 1)> | BS ID (bs-id-lsb) | Mandatory | N/A | 1-16777215 |
| <(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)> | AU Slot ID | Mandatory | N/A | 1-4, 7-9 |
| <(1 to 4 StepSize 1)> | AU Port Number | Mandatory | N/A | 1-4 |

**Command Modes**

Global configuration mode

Note that if all Sector Association entries with a particular BS are deleted (meaning the BS is no longer in use), this BS should be removed from all relevant Neighbour BS lists of other BSs.

### 4.8.2.3 Displaying Configuration Information for Sector Association Entries

To display configuration information of a specific or all Sector Association entries, run the following command:

**npu# show sector-assoc** [bs-id-lsb <(1 to 16777215 StepSize 1)> au-slot-no <(1 to 4StepSize 1) | (7 to 9 StepSize 1)> au-port-no <(1 to 4 StepSize 1)> ]

Specify the BS ID (bs-id-lsb), AU Slot No. (au-slot-no) and AU Port number (au-port-no) if you want to display configuration information for a particular Sector Association entry. Do not specify values for these parameters if you want to view configuration information for all existing Sector Association entries.

**Command Syntax**

**npu# show sector-assoc** [bs-id-lsb <(1 to 16777215 StepSize 1)> au-slot-no <(1 to 4StepSize 1) | (7 to 9 StepSize 1)> au-port-no <(1 to 4 StepSize 1)> ]

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <bs-id-lsb (1 to 16777215 StepSize 1)> | BS ID<br>Specify only if you want to display configuration of a particular Sector Association entry. | Optional | N/A | 1-16777215 |
| <(1 to 4 StepSize 1) \| (7 to 9 StepSize 1)> | AU Slot ID<br>Specify only if you want to display configuration of a particular Sector Association entry. | Optional | N/A | 1-4, 7-9 |
| <(1 to 4 StepSize 1)> | AU Port Number<br>Specify only if you want to display configuration of a particular Sector Association entry. | Optionaly | N/A | 1-4 |

**Display Format**

(for each existing ODU Port if requested for all ODU Ports)

```
BSIDLSB                                  :<value>
AUSlotNo.                                :<value>
AUPortNo.                                :<value>
SectorID                                 :<value>
ODUNo.                                   :<value>
ODUPortNo.                               :<value>
AntennaNo.                               :<value>
AntennaPortNo.                           :<value>
```

**Command Modes**

Global command mode

# 4.9 Monitoring Performance of Hardware and Software Components

This section describes the procedures for:


- "Monitoring Hardware Components" on page 755
- "Monitoring Software Components" on page 763
- "Displaying System Files" on page 798


## 4.9.1 Monitoring Hardware Components

You can use the CLI to monitor performance of the following hardware components with respect to:


- "Displaying the Chassis Temperature" on page 755
- "Displaying the Current Status of Shelf Components" on page 756
- "Displaying Utilization of CPU and Memory Resources for the NPU" on page 758
- "Displaying Packets Discarded via Rate Limiting" on page 758
- "Displaying Location Information for the 4Motion Shelf" on page 761
- "Displaying the Unique Identifier for the 4Motion Shelf" on page 762


### 4.9.1.1 Displaying the Chassis Temperature

To display the current chassis temperature, run the following command:

```
npu# show shelf temperature
```

| | |
|---|---|
| **Command Syntax** | `npu# show shelf temperature` |
| **Privilege Level** | 1 |

| | |
|---|---|
| **Display Format** | `Shelf Temperature : <Temperature>` |

| | |
|---|---|
| **Command Modes** | Global command mode |

### 4.9.1.2 Displaying the Current Status of Shelf Components

You can view the current status of the following shelf components:

- NPU
- PSU
- PIU
- AVU or (specific fan)

To view the current status of all shelf components, run the following command:

**`npu# show shelf status`** `[{`**`NPU`** `[<slot id>] |` **`PSU`** `[<slot id (1-4)>] |`**`PIU`** `[<slot id (1-2)>] |` **`AVU`** `|` **`Fan`** `[<fan_num (1-10)>]}]`

**NOTE**

Refer Figure 4-1 for more information about the slot IDs assigned to each shelf component.

For example, run the following command to view the status of the PSU, slot# 4:

**`npu# show shelf status PSU 4`**

To view the status of all the shelf components, run the following command:

**`npu# show shelf status`**

| | |
|---|---|
| **Command Syntax** | **`npu# show shelf status`** `[{`**`NPU`** `[<slot id>] |` **`PSU`** `[<slot id (1-4)>] |`**`PIU`** `[<slot id (1-2)>] |` **`AVU`** `|` **`Fan`** `[<fan_num (1-10)>]}]` |

| | |
|---|---|
| **Privilege Level** | 1 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| [{NPU [<slot id>] \| PSU [<slot id (1-4)>] \|PIU [<slot id (1-2)>] \| AVU \| Fan [<fan_num (1-10)>]} | Indicates the shelf components for which you want to display the current status. | Optional | N/A | ■ NPU<br>■ PSU<br>■ PIU<br>■ AVU<br>■ Fan<(1-10> |

**Display Format**

```
NPU:

SlotNum   HardwareVersion

<slot ID>   <Version>

PSU:

SlotNum  AdminState  PresentStatus  HealthStatus  OperationalStatus

<Slot ID>  <value>      <value>   <value>      <value>

PIU:

SlotNum  AdminState  ReqHWversion PresentStatus  HealthStatus
OperationalStatus  InstHWversion

<Slot ID>  <value>   <value>     <value>      <value>     <value>
<value>

AVU:

PresentStatus  HealthStatus

<value>         <value>

Fan health:

FanNum   HealthStatus

<Number>     <value>
```

**Command Modes**

Global command mode

### 4.9.1.3 Displaying Utilization of CPU and Memory Resources for the NPU

To display the utilization of CPU and memory resources for the NPU, run the following command:

**npu# show resource usage**

After you run this command, the current CPU and memory usage is displayed.

**NOTE**

For more information about setting thresholds for CPU and memory usage, refer to "Displaying CPU and Memory Utilization Limits for the NPU" on page 178.

| | |
|---|---|
| **Command Syntax** | **npu# show resource usage** |
| **Privilege Level** | 1 |
| **Display Format** | Resource usage [%]:<br>CPU : <CPU Usage><br>Memory : <Memory Usage> |
| **Command Modes** | Global command mode |

### 4.9.1.4 Displaying Packets Discarded via Rate Limiting

To retrieve the number of packets discarded because of rate limiting for a specific or all applications (pre-defined, user-defined or all), run the following command:

**npu# show rate-limit counters** {**ftp** | **telnet** | **tftp** | **ssh** | **icmp** | **snmp** | **R4-R6** | **igmp** | **eap** | **arp** | **all-others** | <user-defined-app> | **all**}

**NOTE**

For more information about configuring rate limiting, refer to "Configuring the Rate Limiting for the NPU" on page 178.

| | |
|---|---|
| **Command Syntax** | **npu# show rate-limit counters** {**ftp** \| **telnet** \| **tftp** \| **ssh** \| **icmp** \| **snmp** \| **R4-R6** \| **igmp** \| **eap** \| **arp** \| **all-others** \| <user-defined-app> \| **all**} |
| **Privilege Level** | 1 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{ftp \| telnet \| tftp \| ssh \| icmp \| snmp \| R4-R6 \| igmp \| eap \| arp \| all-others \| <user-defined-app> \| all}` | Indicates the application for which packets discarded by rate limiting are to be displayed. | Optional | N/A | ■ ftp<br>■ telnet<br>■ tftp<br>■ ssh<br>■ icmp<br>■ snmp<br>■ R4-R6<br>■ igmp<br>■ eap<br>■ arp<br>■ all-others: Refers to all other applications that may send packets to the CPU, and are not in the list of pre-defined or user-defined applications.<br>■ <user defined><br>■ all: Refers to all applications that may attempt to send packets to the CPU. |

**Display Format**

```
RATELIMIT COUNTERS: Pre-defined applications
-------------------------------------------
Application     Packets discarded
 <Application>    <Number of Packets Discarded>
<Application>    <Number of Packets Discarded> SSH
<Application>     <Number of Packets Discarded> SNMP
RATELIMIT COUNTERS: User-defined applications
---------------------------------------------
Application    Packets discarded
<Application>   <Number of Packets Discarded>
```

**Command Modes**

Global command mode

### 4.9.1.5 Displaying Location Information for the 4Motion Shelf

To display location information for the shelf, run the following command:

**npu# show site** [{**Name** |**Address** | **RackLocation** | **ContactPerson** | **AsnName** |**Region** | **ProductType** |**ShelfHwVersion**}]

Specify the shelf parameter for which you want to view the related details. For example, if you want to display information about the rack location, run the following command:

**npu# show site RackLocation**

If you want to view information about for all shelf parameters, run the following command:

**npu# show site**

**Command Syntax**

**npu# show site** [{**Name** |**Address** | **RackLocation** | **ContactPerson** | **AsnName** |**Region** | **ProductType** |**ShelfHwVersion**}]

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[{Name \|Address \| RackLocation \| ContactPerson \|AsnName \|Region \| ProductType \|ShelfHwVersion}]` | Indicates the shelf parameter for which informationis to be displayed. If you do not enter any value for this parameter, information for all the shelf parameters is displayed. | Optional | N/A | ■ Name<br>■ Address<br>■ RackLocation<br>■ ContactPerson<br>■ AsnName<br>■ Region<br>■ ProductType<br>■ ShelfHwVersion |

**Display Format**

```
Site:
Name            : <Name>
Address          : <Address>
Rack Location       : <Location>
Contact Person      : <Name>
ASN Name         : <value>
Region          : <value>
Product Type       : <value>
Shelf HW Version     : <value>
```

**Command Modes**

Global command mode

### 4.9.1.6 Displaying the Unique Identifier for the 4Motion Shelf

To display the unique identifier assigned to the 4Motion shelf, run the following command:

```
npu# show site identifier
```

**NOTE**

An error may occur if you have not configured a unique identifier for the 4Motion shelf.

| | |
|---|---|
| **Command Syntax** | **`npu# show site identifier`** |
| **Privilege Level** | 1 |
| **Display Format** | `Device Id  :  <Device ID>` |
| **Command Modes** | Global command mode |

## 4.9.2 Monitoring Software Components

**IMPORTANT**

The software components listed in this section are available only if you are operating the NPU in the ASN-GW mode. Skip this section if you are operating the NPU in the transparent mode.

This section describes the following procedures for monitoring the following software components:


- "Managing Statistics for the IGMP Functionality" on page 764
- "Managing statistics for the MIP-FA functionality" on page 766
- "Managing Statistics for the PMIP Client Functionality" on page 768
- "Managing Statistics for the Authenticator Functionality" on page 770
- "Managing Statistics for the Data Path Function" on page 775
- "Managing Statistics for the Context Function" on page 780
- "Managing Statistics for the MS State Change Functionality" on page 782

- "Managing Statistics for RADIUS" on page 785
- "Managing Statistics for the DHCP Server" on page 787
- "Managing Statistics for the DHCP Proxy" on page 789
- "Managing Statistics for the DHCP Relay" on page 791
- "Managing Statistics for the SFA Functionality" on page 793


## 4.9.2.1 Managing Statistics for the IGMP Functionality

**IMPORTANT**

The IGMP functionality is not supported in the current release.

This section describes the commands to be used for:


- "Displaying Statistics for the IGMP Functionality" on page 764
- "Resetting Statistics for the IGMP Functionality" on page 765


### 4.9.2.1.1 Displaying Statistics for the IGMP Functionality

You can display statistics counters that provide information about the IGMP queries received and transmitted. The following table lists the statistics counters for the IGMP functionality:

**Table 4-50: Statistics Counters for the IGMP Functionality**

| Statistics Counter | Indicates the number of... |
|---|---|
| `igmpQueryRx` | IGMP queries received by the NPU. |
| `igmpReportRx` | IGMP reports received by the NPU. |
| `igmpReportTx` | IGMP reports transmitted by the NPU. |
| `igmpErrQueryRx` | IGMP erroneous queries received by the NPU. |
| `igmpErrReportRx` | IGMP erroneous reports received by the NPU. |
| `igmpMcastGroups` | Active IGMP multicast groups. |
| `igmpInvalidEvent` | invalid events that have occurred because of receipt of IGMP messages. |

Run the following command to display statistics for the IGMP functionality:

**npu# show igmp statistics**

After you run this command, the statistics for the IGMP functionality are displayed.

| | |
|---|---|
| **Command Syntax** | **npu# show igmp statistics** |
| **Privilege Level** | 1 |
| **Display Format** | IGMP Statistics:<br>igmpQueryRx = <value><br>igmpReportRx = <value><br>igmpReportTx = <value><br>igmpErrQueryRx = <value><br>igmpErrReportRx = <value><br>igmpMcastGroups = <value><br>igmpInvalidEvent = <value> |
| **Command Modes** | Global command mode |

#### 4.9.2.1.2 Resetting Statistics for the IGMP Functionality

Run the following command to reset statistics for the IGMP functionality:

**npu# clear igmp statistics**

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 15.

## 4.9.2.2 Managing statistics for the MIP-FA functionality

**IMPORTANT**

The MIP-FA functionality is not supported in the current release.

This section describes the commands to be used for:

- "Displaying Statistics for the MIP-FA Functionality" on page 766
- "Resetting Statistics for the MIP-FA Functionality" on page 768

### 4.9.2.2.1 Displaying Statistics for the MIP-FA Functionality

You can display statistics counters that provide information about the requests and responses, and the number of active and failed IP address allocations by the MIP-FA functionality. The following table lists the statistics counters for the MIP-FA functionality:

**Table 4-51: Statistics Counters for the MIP-FA Functionality**

| Statistics Counter | Indicates the number of... |
|---|---|
| `mipNumCmipMS` | MSs for which the NPU is serving as the FA. |
| `mipRRQRx` | MIP registration requests received by the MIP-FA (NPU). |
| `mipRRPRx` | MIP registration responses received by the MIP-FA (NPU). |
| `mipRRQTx` | MIP registration requests transmitted by the MIP-FA (NPU). This does not include retransmissions. |
| `mipRRPTx` | MIP registration responses transmitted by the MIP-FA (NPU). This does not include retransmissions. |
| `mipRRQErr` | Erroneous MIP registration requests received by the MIP-FA (NPU). |
| `mipRRPErr` | Erroneous MIP registration responses received by the MIP-FA (NPU). |
| `mipAgentAdvTx` | MIP agent advertisements transmitted by the MIP-FA (NPU). This does not include retransmissions. |

**Table 4-51: Statistics Counters for the MIP-FA Functionality**

| | |
|---|---|
| `mipAgentSolRx` | MIP agent solicitation messages transmitted by the MIP-FA (NPU). This does not include retransmissions. |
| `mipMsLifetimeExp` | MSs for which the NPU is serving as the MIP-FA and the MS lifetime has expired. |
| `mipIpAllocFailed` | IP address allocation failures that have occurred (for MSs for which the NPU is serving as the MIP-FA). |
| `mipIpDeallocFailed` | IP address deallocation failures that have occurred (for MSs for which the NPU is serving as the MIP-FA). |
| `mipInvalidEvent` | Invalid events that have occurred because of receipt of messages by MIP-FA (NPU). |

Run the following command to display statistics for the MIP-FA functionality:

**`npu# show mip-fa statistics`**

After you run this command, the statistics for the MIP-FA functionality are displayed.

| | |
|---|---|
| **Command Syntax** | **`npu# show mip-fa statistics`** |
| **Privilege Level** | 1 |

**Display Format**

```
MIP-FA Statistics :
mipNumCmipMS = <value>
mipRRQRx = <value>
mipRRPRx = <value>
mipRRQTx = <value>
mipRRPTx = <value>
mipRRQErr = <value>
mipRRPErr = <value>
mipAgentAdvTx = <value>
mipAgentSolRx = <value>
mipMsLifetimeExp = <value>
 = <value>
mipIpDeallocFailed = <value>
mipInvalidEvent = <value>
```

**Command Modes**

Global command mode

#### 4.9.2.2.2 Resetting Statistics for the MIP-FA Functionality

Run the following command to reset statistics for the MIP-FA functionality

```
npu# clear mip-fa statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 15.

### 4.9.2.3 Managing Statistics for the PMIP Client Functionality

**IMPORTANT**

The PMIP client functionality is not supported in the current release.

This section describes the commands to be used for:

■ “Displaying Statistics for the PMIP Client Functionality” on page 769

■ “Resetting Statistics for the PMIP Client Functionality” on page 770

#### 4.9.2.3.1 Displaying Statistics for the PMIP Client Functionality

You can display statistics counters that provide information about the requests and responses, and the number of active and failed IP address allocations by the PMIP client functionality. The following table lists the statistics counters for the PMIP client functionality:

**Table 4-52: Statistics Counters for the PMIP Client Functionality**

| Statistics Counter | Indicates the number of... |
|---|---|
| mipNumPmipMS | MSs for which the NPU is serving as the PMIP client. |
| mipRRPRx | MIP registration responses received by the PMIP client (NPU). |
| mipRRQTx | MIP registration requests transmitted by the PMIP client (NPU). This does not include retransmissions. |
| mipRRQRtx | MIP registration requests retransmitted by the PMIP client (NPU). |
| mipRRPErr | Erroneous MIP registration responses received by the PMIP client (NPU). |
| mipMsSoftLifetimeExp | Number of times the soft lifetime timer has expired. |
| mipIpAllocFailed | Failed IP address allocations by by the PMIP client (NPU). |
| mipIpDeallocFailed | Failed IP address deallocations by by the PMIP client (NPU). |
| mipFaMigFailed | FA migration failures. |
| mipInvalidEvent | Invalid events that occurred because of receipt of MIP messages by the PMIP client (NPU). |

Run the following command to display statistics for the PMIP client functionality:

```
npu# show mip-client statistics
```

After you run this command, the statistics for the PMIP client functionality are displayed.

| | |
|---|---|
| **Command Syntax** | **npu# show mip-client statistics** |
| **Privilege Level** | 1 |
| **Display Format** | PMIP-Client Statistics :<br>mipNumPmipMS = <value><br>mipRRPRx = <value><br>mipRRQTx = <value><br>mipRRQRtx = <value><br>mipRRPErr = <value><br>mipMsSoftLifetimeExp = <value><br>mipIpAllocFailed = <value><br>mipIpDeallocFailed = <value><br>mipFaMigFailed = <value><br>mipInvalidEvent = <value> |
| **Command Modes** | Global command mode |

#### 4.9.2.3.2 Resetting Statistics for the PMIP Client Functionality

Run the following command to reset statistics for the PMIP client functionality:

**npu# clear pmip-client statistics**

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 15.

### 4.9.2.4 Managing Statistics for the Authenticator Functionality

This section describes the commands to be used for:

- “Displaying Statistics for the Authenticator Functionality” on page 771

■ “Resetting Statistics for the Authenticator Functionality” on page 775

#### 4.9.2.4.1 Displaying Statistics for the Authenticator Functionality

You can display statistics counters that provide information about the EAP messages, and successful and failed authentications handled by the Authenticator functionality. The following table lists the statistics counters for the Authenticator functionality:

**Table 4-53: Statistics Counters for the Authenticator Functionality**

| Statistics Counter | Indicates the number of... |
|---|---|
| `eapIdReqTx` | EAP ID requests transmitted by the Authenticator functionality (NPU). This does not include the number of retransmissions. |
| `eapIdReqRtx` | EAP ID requests retransmitted by the Authenticator functionality (NPU). |
| `eapIdRspRx` | EAP ID responses received by the Authenticator functionality (NPU). |
| `eapIdRspDrop` | EAP ID responses dropped by the Authenticator functionality (NPU). |
| `eapTransferTx` | EAP transfers transmitted by the Authenticator functionality (NPU). This does not include the number of retransmissions. |
| `eapTransferRtx` | EAP transfers retransmitted by the Authenticator functionality (NPU). |
| `eapTransferRx` | EAP transfers received by the Authenticator functionality (NPU). |
| `eapTransferDrop` | EAP transfers dropped by the Authenticator functionality (NPU). |
| `eapStartRx` | EAP start messages received by the Authenticator functionality (NPU). |
| `eapStartDrop` | EAP start messages dropped by the Authenticator functionality (NPU). |
| `eapCounterIdReqExp` | Failed EAP ID request retries. |
| `eapCounterTransferExp` | Failed EAP ID request retries. |
| `eapRndOver` | EAP transfer rounds that have exceeded the threshold for the maximum number of permitted EAP rounds. |

**Table 4-53: Statistics Counters for the Authenticator Functionality**

| | |
|---|---|
| eapAuthSuccess | MSs that are successfully authenticated. |
| eapAuthFailure | MSs for which authentication has failed. |
| eapAuthAttempts | Authentication attempts processed by the Authenticator functionality (NPU). |
| eapReauthSuccess | Successful reauthentications. |
| eapReauthFailure | Failed MS reauthentications. |
| eapReauthAttempts | Reauthentication attempts processed by the Authenticator functionality (NPU). |
| eapInvalidNai | Invalid NAIs received by the Authenticator functionality (NPU). |
| eapInvalidNaiLen | Times an NAI with an invalid length is received by the Authenticator functionality (NPU) in the EAP response ID message. |
| eapInvalidNaiRealm | Times an NAI with an invalid realm is received by the Authenticator functionality (NPU) in the EAP response ID message. |
| eapInvalidNaiPseudoId | Times an NAI with an invalid psuedo ID is received by the Authenticator functionality in the EAP response ID message. |
| eapNaiMismatchAuthMode | Times an NAI with an invalid authentication mode is received by the Authenticator functionality in an EAP response ID message. |
| authUnauthMS | Unauthnticated MSs. |
| arpEapTransferTx | EAP transfers transmitted by the Authenticator functionality (NPU). |
| arpEapTransferRx | EAP transfers received by the Authenticator functionality (NPU). |
| arpEapTransferDrop | EAP transfers dropped by the Authenticator functionality (NPU). |
| arpEapStartRx | EAP start messages received by the Authenticator functionality (NPU). |
| arpEapStartDrop | EAP start messages dropped by the Authenticator functionality (NPU). |

Run the following command to display statistics for the Authenticator functionality:

```
npu# show authenticator statistics
```

After you run this command, the statistics for the Authenticator functionality are displayed.

| | |
|---|---|
| **Command Syntax** | `npu# show authenticator statistics` |
| **Privilege Level** | 1 |

**Display Format**

```
Authenticator Function Statistics :
eapIdReqTx = <value>
eapIdReqRtx = <value>
eapIdRspRx = <value>
eapIdRspDrop = <value>
eapTransferTx = <value>
eapTransferRtx = <value>
eapTransferRx = <value>
eapTransferDrop = <value>
eapStartRx = <value>
eapStartDrop = <value>
eapCounterIdReqExp = <value>
eapCounterTransferExp = <value>
eapRndOver = <value>
eapAuthSuccess = <value>
eapAuthFailure = <value>
eapAuthAttempts = <value>
eapReauthSuccess = <value>
eapReauthFailure = <value>
eapReauthAttempts = <value>
eapInvalidNai = <value>
eapInvalidNaiLen = <value>
eapInvalidNaiRealm = <value>
eapInvalidNaiPseudoId = <value>
eapNaiMismatchAuthMode = <value>
authUnauthMS = <value>
arpEapTransferTx = <value>
arpEapTransferRx = <value>
arpEapTransferDrop = <value>
arpEapStartRx = <value>
arpEapStartDrop = <value>
```

| Command Modes | Global command mode |
|---|---|

#### 4.9.2.4.2 Resetting Statistics for the Authenticator Functionality

Run the following command to reset statistics for the Authenticator functionality:

```
npu# clear authenticator statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 15.

### 4.9.2.5 Managing Statistics for the Data Path Function

This section describes the commands to be used for:

- "Displaying Statistics for the Data Path Function" on page 775
- "Resetting Data Path Statistics" on page 780

#### 4.9.2.5.1 Displaying Statistics for the Data Path Function

You can display statistics counters that provide information about the data path registration, pre-registration and de-registration requests and responses handled by the data path function. The following table lists the statistics counters for the data path function:

**Table 4-54: Statistics Counters for the Data Path Function**

| Statistics Counter | Indicates the number of... |
|---|---|
| dpPathRegReqRx | Path registration requests received by the data path function (NPU). |
| dpPathRegReqTx | Path registration requests transmitted by the data path function (NPU). This does not include the number of retransmissions. |
| dpPathRegReqRtx | Path registration requests retransmitted by the data path function (NPU). |
| dpPathRegReqDrop | Path registration requests dropped by the data path function (NPU). |

**Table 4-54: Statistics Counters for the Data Path Function**

| | |
|---|---|
| dpPathRegRprtRx | Path registration reports received by the data path function (NPU). |
| dpPathRegRprtTx | Path registration reports transmitted by the data path function (NPU). This does not include the number of retransmissions. |
| dpPathRegRprtRtx | Path registration reports retransmitted by the data path function (NPU). |
| dpPathRegRprtDrop | Path registration reports dropped by the data path function (NPU). |
| dpPathRegRprtAckRx | Path registration reports for which the data path function (NPU) has received an ACK. |
| dpPathRegRprtAckTx | Path registration reports for which the data path function (NPU) has trasnmitted an ACK. |
| dpPathRegRprtAckDrop | Path registration reports for which the data path function (NPU) has dropped an ACK. |
| dpPathPreRegReqRx | Path pre-registration requests received by the data path function (NPU). |
| dpPathPreRegReqTx | Path pre-registration requests transmitted by the data path function (NPU). This does not include the number of retransmissions. |
| dpPathPreRegReqRtx | Path pre-registration requests retransmitted by the data path function (NPU). |
| dpPathPreRegReqDrop | Path pre-registration requests dropped by the data path function (NPU). |
| dpPathPreRegRprtRx | Path pre-registration reports received by the data path function (NPU). |
| dpPathPreRegRprtTx | Path pre-registration reports transmitted by the data path function (NPU). This does not include the number of retransmissions. |
| dpPathPreRegRprtRtx | Path pre-registration reports retransmitted by the data path function (NPU). |

**Table 4-54: Statistics Counters for the Data Path Function**

| | |
|---|---|
| dpPathPreRegRprtDrop | Path pre-registration reports dropped by the data path function (NPU). |
| dpPathPreRegRprtAckRx | Path pre-registration reports for which the data path function (NPU) has received an ACK. |
| dpPathPreRegRprtAckTx | Path pre-registration reports for which the data path function (NPU) has transmitted an ACK. |
| dpPathPreRegRprtAckDrop | Path pre-registration reports for which the data path function (NPU) has dropped an ACK. |
| dpPathDeregReqRx | Path de-registration requests received by the data path function (NPU). |
| dpPathDeregReqTx | Path de-registration requests transmitted by the data path function (NPU). This does not include the number of retransmissions. |
| dpPathDeregReqRtx | Path de-registration requests retransmitted by the data path function (NPU). |
| dpPathDeregReqDrop | Path de-registration requests dropped by the data path function (NPU). |
| dpPathDeregRprtRx | Path de-registration reports received by the data path function (NPU). |
| dpPathDeregRprtTx | Path de-registration reports transmitted by the data path function (NPU). This does not include the number of retransmissions. |
| dpPathDeregRprtRtx | Path de-registration reports retransmitted by the data path function (NPU). |
| dpPathDeregRprtDrop | Path de-registration reports transmitted by the data path function (NPU). |
| dpPathDeregRprtAckRx | Path de-registration reports for which the data path function (NPU) has received an ACK. |
| dpPathDeregRprtAckTx | Path de-registration reports for which the data path function (NPU) has transmitted an ACK. |

**Table 4-54: Statistics Counters for the Data Path Function**

| | |
|---|---|
| dpPathDeregRprtAckDrop | Path de-registration reports for which the data path function (NPU) has dropped an ACK. |
| dpActiveSF | Active service flows. |
| dpActiveGRESessions | Active GRE sessions. |

Run the following command to display statistics for the data path function:

```
npu# show datapath statistics
```

After you run this command, the statistics for the data path function are displayed.

| | |
|---|---|
| **Command Syntax** | `npu# show datapath statistics` |
| **Privilege Level** | 1 |

**Display Format**

```
Data Path Function Statistics :
dpPathRegReqRx = <value>
dpPathRegReqTx = <value>
dpPathRegReqRtx = <value>
dpPathRegReqDrop = <value>
dpPathRegRprtRx = <value>
dpPathRegRprtTx = <value>
dpPathRegRprtRtx = <value>
dpPathRegRprtDrop = <value>
dpPathRegRprtAckRx = <value>
dpPathRegRprtAckTx = <value>
dpPathRegRprtAckDrop = <value>
dpPathPreRegReqRx = <value>
dpPathPreRegReqTx = <value>
dpPathPreRegReqRtx = <value>
dpPathPreRegReqDrop = <value>
dpPathPreRegRprtRx = <value>
dpPathPreRegRprtTx = <value>
dpPathPreRegRprtRtx = <value>
dpPathPreRegRprtDrop = <value>
dpPathPreRegRprtAckRx = <value>
dpPathPreRegRprtAckTx = <value>
dpPathPreRegRprtAckDrop = <value>
dpPathDeregReqRx = <value>
dpPathDeregReqTx = <value>
dpPathDeregReqRtx = <value>
dpPathDeregReqDrop = <value>
dpPathDeregRprtRx = <value>
dpPathDeregRprtTx = <value>
dpPathDeregRprtRtx = <value>
dpPathDeregRprtDrop = <value>
dpPathDeregRprtAckRx = <value>
dpPathDeregRprtAckTx = <value>
dpPathDeregRprtAckDrop = <value>
dpActiveSF = <value>
dpActiveGRESessions = <value>
```

**Command Modes**

Global command mode

#### 4.9.2.5.2 Resetting Data Path Statistics

Run the following command to reset statistics for the data path functionality:

```
npu# clear datapath statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 15.

## 4.9.2.6 Managing Statistics for the Context Function

This section describes the commands to be used for:

- "Displaying Statistics for the Context Function" on page 780
- "Resetting Statistics for the Context Function" on page 782

#### 4.9.2.6.1 Displaying Statistics for the Context Function

You can display statistics counters that provide information about the requests and reports transmitted and received by the Context function. The following table lists the statistics counters for the Context function:

**Table 4-55: Statistics Counters for the Context Function**

| Statistics Counter | Indicates the number of... |
|---|---|
| `ctxtfnCtxtReqTx` | Context requests transmitted by the Context function (NPU). This does not include retransmissions. |
| `ctxtfnCtxtReqRtx` | Context requests retransmitted by the Context function (NPU). |
| `ctxtfnCtxtReqRx` | Context requests received by the Context function (NPU). |
| `ctxtfnCtxtReqDrop` | Context requests dropped by the Context function (NPU). |
| `ctxtfnCtxtRprtTx` | Context reports transmitted by the Context function (NPU). This does not include retransmission. |
| `ctxtfnCtxtRprtRtx` | Context reports retransmitted by the Context function (NPU). |

**Table 4-55: Statistics Counters for the Context Function**

| | |
|---|---|
| ctxtfnCtxtRprtRx | Context reports received by the Context function (NPU). |
| ctxtfnCtxtRprtDrop | Context reports dropped by the Context function (NPU). |
| ctxtfnCtxtRprtAckTx | Context reports transmitted by the Context function (NPU). |
| ctxtfnCtxtRprtAckRx | Context report ACK messages received by the Context function (NPU). |
| ctxtfnCtxtRprtAckDrop | Context report ACK messages dropped by the Context function (NPU). |
| ctxtfnPkmv2Failure | PKMv2 handshake failures that have occurred. |

Run the following command to display statistics for the context function.

**npu# show contextfn statistics**

After you run this command, the statistics for the context function are displayed.

| | |
|---|---|
| **Command Syntax** | **npu# show contextfn statistics** |
| **Privilege Level** | 1 |

**Display Format**

```
Context Function Statistics :
ctxtfnCtxtReqTx = <value>
ctxtfnCtxtReqRtx = <value>
ctxtfnCtxtReqRx = <value>
ctxtfnCtxtReqDrop = <value>
ctxtfnCtxtRprtTx = <value>
ctxtfnCtxtRprtRtx = <value>
ctxtfnCtxtRprtRx = <value>
ctxtfnCtxtRprtDrop = <value>
ctxtfnCtxtRprtAckTx = <value>
ctxtfnCtxtRprtAckRx = <value>
ctxtfnCtxtRprtAckDrop = <value>
ctxtfnPkmv2Failure = <value>
```

**Command Modes**

Global command mode

#### 4.9.2.6.2 Resetting Statistics for the Context Function

Run the following command to reset statistics for the context function:

```
npu# clear contextfn statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 15.

### 4.9.2.7 Managing Statistics for the MS State Change Functionality

This section describes the commands to be used for:

- “Displaying Statistics for the MS State Change Functionality” on page 783
- “Resetting Statistics for the MS State Change Functionality” on page 785

#### 4.9.2.7.1 Displaying Statistics for the MS State Change Functionality

You can display statistics counters that provide information about the requests and responses transmitted and received by the MS state change functionality. The following table lists the statistics counters for the MS state change functionality:

**Table 4-56: Statistics Counters for the MS State Change Functionality**

| Statistics Counter | Indicates the number of... |
|---|---|
| `msscfnMsscReqTx` | MS state change requests transmitted by the MS state change functionality (NPU). This does not include retransmissions. |
| `msscfnMsscReqRtx` | MS state change requests retransmitted by the MS state change functionality (NPU). |
| `msscfnMsscReqRx` | MS state change requests received by the MS state change functionality (NPU). |
| `msscfnMsscReqDrop` | MS state change requests dropped by the MS state change functionality (NPU). |
| `msscfnMsscRspTx` | MS state change responses transmitted by the MS state change functionality (NPU). This does not include retransmissions. |
| `msscfnMsscRspRtx` | MS state change responses retransmitted by the MS state change functionality (NPU). |
| `msscfnMsscRspRx` | MS state change responses received by the MS state change functionality (NPU). |
| `msscfnMsscRspDrop` | MS state change responses dropped by the MS state change functionality (NPU). |
| `msscfnMsscRspAckTx` | MS state change response ACK messages transmitted by the MS state change functionality (NPU). |
| `msscfnMsscRspAckRx` | MS state change response ACK messages received by the MS state change functionality (NPU). |

**Table 4-56: Statistics Counters for the MS State Change Functionality**

| | |
|---|---|
| msscfnMsscRspAckDrop | MS state change response ACK messages dropped by the MS state change functionality (NPU). |
| msscfnMsUnsuppSecCap | MS network entry failures because of unsupported security capabilities. |
| msscfnMsSecCapMismatch | MS network entry failures because of unsupported security capability mismatch. |

Run the following command to display statistics for the MS state change functionality.

**npu# show msscfn statistics**

After you run this command, the statistics for the MS state change functionality are displayed.

**Command Syntax**

**npu# show msscfn statistics**

**Privilege Level**

1

**Display Format**

```
MS State Change Function Statistics :
msscfnMsscReqTx = <value>
msscfnMsscReqRtx = <value>
msscfnMsscReqRx = <value>
msscfnMsscReqDrop = <value>
msscfnMsscRspTx = <value>
msscfnMsscRspRtx = <value>
msscfnMsscRspRx = <value>
msscfnMsscRspDrop = <value>
msscfnMsscRspAckTx = <value>
msscfnMsscRspAckRx = <value>
msscfnMsscRspAckDrop = <value>
msscfnMsUnsuppSecCap = <value>
msscfnMsSecCapMismatch = <value>
```

| | |
|---|---|
| **Command Modes** | Global command mode |

#### 4.9.2.7.2 Resetting Statistics for the MS State Change Functionality

Run the following command to reset statistics for the MS state change functionality:

```
npu# clear msscfn statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 15.

### 4.9.2.8 Managing Statistics for RADIUS

This section describes the commands to be used for:

- "Displaying Statistics for RADIUS" on page 785
- "Resetting Statistics for RADIUS" on page 787

#### 4.9.2.8.1 Displaying Statistics for RADIUS

You can display statistics counters that provide information about the access, postpaid, and prepaid accounting requests and responses processed by the RADIUS function. The following table lists the statistics counters for the RADIUS function:

**Table 4-57: Statistics Counters for RADIUS**

| Statistics Counter | Indicates the number of... |
|---|---|
| msscfnMsscReqTx | MS state change requests transmitted by the MS state change functionality (NPU). This does not include retransmissions. |
| msscfnMsscReqRtx | MS state change requests retransmitted by the MS state change functionality (NPU). |
| msscfnMsscReqRx | MS state change requests received by the MS state change functionality (NPU). |

**Table 4-57: Statistics Counters for RADIUS**

| | |
|---|---|
| msscfnMsscReqDrop | MS state change requests dropped by the MS state change functionality (NPU). |
| msscfnMsscRspTx | MS state change responses transmitted by the MS state change functionality (NPU). This does not include retransmissions. |
| msscfnMsscRspRtx | MS state change responses retransmitted by the MS state change functionality (NPU). |
| msscfnMsscRspRx | MS state change responses received by the MS state change functionality (NPU). |
| msscfnMsscRspDrop | MS state change responses dropped by the MS state change functionality (NPU). |
| msscfnMsscRspAckTx | MS state change response ACK messages transmitted by the MS state change functionality (NPU). |
| msscfnMsscRspAckRx | MS state change response ACK messages received by the MS state change functionality (NPU). |
| msscfnMsscRspAckDrop | MS state change response ACK messages dropped by the MS state change functionality (NPU). |
| msscfnMsUnsuppSecCap | MS network entry failures because of unsupported security capabilities. |
| msscfnMsSecCapMismatch | MS network entry failures because of unsupported security capability mismatch. |

Run the following command to display statistics for RADIUS.

**npu# show radius statistics**

After you run this command, the statistics for RADIUS are displayed.

**Command Syntax** **npu# show radius statistics**

| | |
|---|---|
| **Privilege Level** | 1 |

**Display Format**

```
Radius Statistics :
radAccessReqTx = <value>
radAccessReqRtx = <value>
radAccessChallengeRx = <value>
radAccessAcceptRx = <value>
radAccessRejectRx = <value>
radAccessChallengeDrop = <value>
radAccessAcceptDrop = <value>
radAccessRejectDrop = <value>
radTimerAccessReqExp = <value>
radCounterAccessReqExp = <value>
radInvalidEvent = <value>
radMsProfileChange = <value>
radEapMismatch = <value>
```

| | |
|---|---|
| **Command Modes** | Global command mode |

#### 4.9.2.8.2 Resetting Statistics for RADIUS

Run the following command to reset RADIUS statistics:

```
npu# clear radius statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 10.

### 4.9.2.9 Managing Statistics for the DHCP Server

This section describes the commands to be used for:

- “Displaying Statistics for the DHCP Server” on page 788
- “Resetting DHCP Server Statistics” on page 789

#### 4.9.2.9.1 Displaying Statistics for the DHCP Server

You can display statistics counters that provide information about the requests and responses processed by the DHCP server. The following table lists the statistics counters for the DHCP server:

**Table 4-58: Statistics Counters for DHCP Server**

| Statistics Counter | Indicates the number of... |
|---|---|
| dhcpDiscoverRx | DHCP discover messages received by the DHCP server (NPU). |
| dhcpRequestRx | DHCP request messages received by the DHCP server (NPU). |
| dhcpDiscoverDrop | DHCP discover messages dropped by the DHCP server (NPU). |
| dhcpRequestDrop | DHCP request messages dropped by the DHCP server (NPU). |
| dhcpReleaseRx | DHCP release messages received by the DHCP server (NPU). |
| dhcpReleaseDrop | DHCP release messages dropped by the DHCP server (NPU). |
| dhcpLeaseTimerExp | DHCP lease timer expiries the DHCP server (NPU). |
| dhcpInvalidEvent | Invalid events that occurred because of DHCP messages received by the DHCP server (NPU). |

Run the following command to display statistics for the DCHP server.

```
npu# show dhcp-server statistics
```

After you run this command, the statistics for the DHCP server are displayed.

| | |
|---|---|
| **Command Syntax** | `npu# show dhcp-server statistics` |
| **Privilege Level** | 1 |

**Display Format**

```
DHCP Server Statistics :
dhcpDiscoverRx = <value>
dhcpDiscoverDrop = <value>
dhcpRequestRx = <value>
dhcpRequestDrop = <value>
dhcpReleaseRx = <value>
dhcpReleaseDrop = <value>
dhcpLeaseTimerExp = <value>
dhcpInvalidEvent = <value>
```

**Command Modes**

Global command mode

#### 4.9.2.9.2 Resetting DHCP Server Statistics

Run the following command to reset statistics for the DHCP server:

```
npu# clear dhcp-server statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 10.

### 4.9.2.10 Managing Statistics for the DHCP Proxy

This section describes the commands to be used for:


- "Displaying Statistics for the DHCP Proxy" on page 789
- "Resetting Statistics for the DHCP Proxy" on page 791


#### 4.9.2.10.1 Displaying Statistics for the DHCP Proxy

You can display statistics counters for the DHCP proxy. The following table lists the statistics counters for the DHCP proxy:

**Table 4-59: Statistics Counters for the DHCP Proxy**

| Statistics Counter | Indicates the number of... |
|---|---|

**Table 4-59: Statistics Counters for the DHCP Proxy**

| | |
|---|---|
| dhcpDiscoverRx | DHCP discover messages received by the DHCP proxy. |
| dhcpDiscoverDrop | DHCP discover messages dropped by the DHCP proxy. |
| dhcpRequestRx | DHCP requests received by the DHCP proxy. |
| dhcpRequestDrop | DHCP requests dropped by the DHCP proxy. |
| dhcpLeaseTimerExp | DHCP lease timer expiries handled by the DHCP proxy. |
| dhcpInvalidEvent | Invalid events that have occurred because of DHCP messages received by the DHCP proxy. |

Run the following command to display statistics for the DCHP proxy.

```
npu# show dhcp-proxy statistics
```

After you run this command, the statistics for the DHCP proxy are displayed.

**Command Syntax**

```
npu# show dhcp-proxy statistics
```

**Privilege Level**

1

**Display Format**

```
DHCP Proxy Statistics :
dhcpDiscoverRx = <value>
dhcpDiscoverDrop = <value>
dhcpRequestRx = <value>
dhcpRequestDrop = <value>
dhcpReleaseRx = <value>
dhcpReleaseDrop = <value>
dhcpLeaseTimerExp = <value>
dhcpInvalidEvent = <value>
```

**Command Modes**

Global command mode

#### 4.9.2.10.2 Resetting Statistics for the DHCP Proxy

Run the following command to reset statistics for the DHCP proxy:

```
npu# clear dhcp-proxy statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 10.

### 4.9.2.11 Managing Statistics for the DHCP Relay

This section describes the commands to be used for:


- "Displaying Statistics for the DHCP Relay" on page 791
- "Resetting Statistics for the DHCP Relay" on page 793


#### 4.9.2.11.1 Displaying Statistics for the DHCP Relay

You can display statistics counters for the DHCP relay. The following table lists the statistics counters for the DHCP relay:

**Table 4-60: Statistics Counters for the DHCP Relay**

| Statistics Counter | Indicates the number of... |
|---|---|
| `dhcpDiscoverRx` | DHCP discover messages received by the DHCP relay. |
| `dhcpDiscoverDrop` | DHCP discover messages dropped by the DHCP relay. |
| `dhcpOfferRx` | DHCP offer messages received by the DHCP relay. |
| `dhcpOfferDrop` | DHCP offer messages dropped by the DHCP relay. |
| `dhcpRequestRx` | DHCP requests received by the DHCP relay. |
| `dhcpRequestDrop` | DHCP requests dropped by the DHCP relay. |
| `dhcpAckRx` | DHCP ACK messages received by the DHCP relay. |
| `dhcpAckDrop` | DHCP ACK messages dropped received by the DHCP relay. |

**Table 4-60: Statistics Counters for the DHCP Relay**

| | |
|---|---|
| dhcpNakRx | DHCP NACK messages received by the DHCP relay. |
| dhcpNakDrop | DHCP NACK messages dropped by the DHCP relay. |
| dhcpIpAllocFailed | Failed IP address allocations handled by the DHCP relay. |
| dhcpInvalidEvent | Invalid events that occurred because of messages received by the DHCP relay. |

Run the following command to display statistics for the DCHP relay.

**npu# show dhcp-relay statistics**

After you run this command, the statistics for the DHCP relay are displayed.

**Command Syntax**

**npu# show dhcp-relay statistics**

**Privilege Level**

1

**Display Format**

```
DHCP Relay Statistics :
dhcpDiscoverRx = <value>
dhcpDiscoverDrop = <value>
dhcpOfferRx = <value>
dhcpOfferDrop = <value>
dhcpRequestRx = <value>
dhcpRequestDrop = <value>
dhcpAckRx = <value>
dhcpAckDrop = <value>
dhcpNakRx = <value>
dhcpNakDrop = <value>
dhcpIpAllocFailed = <value>
dhcpInvalidEvent = <value
```

**Command Modes**

Global command mode

#### 4.9.2.11.2 Resetting Statistics for the DHCP Relay

Run the following command to reset statistics for the DHCP relay:

```
npu# clear dhcp-relay statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 10.

### 4.9.2.12 Managing Statistics for the SFA Functionality

You can display statistics counters for the DHCP relay. This section describes the commands to be used for:


- "Displaying Statistics for the SFA Functionality" on page 793
- "Resetting Statistics for the SFA Functionality" on page 794


#### 4.9.2.12.1 Displaying Statistics for the SFA Functionality

The following table lists the statistics counters for the SFA functionality:

**Table 4-61: Statistics Counters for the SFA Functionality**

| Statistics Counter | Indicates the number of Times... |
|---|---|
| `sfaQosMappingFail` | QoS mapping has failed. |
| `sfaSfDescMissing` | Service flow description is missing. |
| `sfaDfltLpApplied` | Default local profile is applied. |
| `sfaRejMsMissingProf` | MSs are rejected rejected because of a missing service profile. |
| `sfaLocalServProfApplied` | Local service profile is applied. |

Run the following command to display statistics for the SFA functionality.

```
npu# show sfa statistics
```

After you run this command, the statistics for the SFA functionality are displayed.

| | |
|---|---|
| **Command Syntax** | `npu# show sfa statistics` |

| | |
|---|---|
| **Privilege Level** | 1 |
| **Display Format** | `SFA Statistics :`<br>`sfaQosMappingFail = <value>`<br>`sfaSfDescMissing = <value>`<br>`sfaDfltLpApplied = <value>`<br>`sfaRejMsMissingProf = <value>`<br>`sfaLocalServProfApplied = <value>` |
| **Command Modes** | Global command mode |

### 4.9.2.12.2 Resetting Statistics for the SFA Functionality

Run the following command to reset statistics for the SFA functionality:

```
npu# clear sfa statistics
```

After you run this command, the statistics counter is reset to 0.

**NOTE**

The privilege level of this command is 10.

## 4.9.2.13 Displaying Statistics for Physical and IP Interfaces

The following table lists the statistics counters for the physical interfaces:

**Table 4-62: Statistics Counters for the Physical Interfaces**

| Statistics Counter | Indicates the number of... |
|---|---|
| `rxUnicast Packets` | Unicast packets received by the AU. |
| `rxMulticast Packets` | Multicast packets received by the AU. |
| `rxBroadcast Packets` | Broadcast packets received by the AU. |
| `rxDiscarded Packets` | Discarded packets received by the AU. |
| `rxError Packets` | Erroneous packets received by the AU. |
| `rxUnknown Packets` | Unknown packets received by the AU. |
| `txBytes` | Bytes transmitted by the AU. |

**Table 4-62: Statistics Counters for the Physical Interfaces**

| | |
|---|---|
| txUnicast Packets | Unicast packets transmitted by the AU. |
| txBroadcast Packets | Broadcast packets transmitted by the AU. |
| txMulticast Packets | Multicast packets transmitted by the AU. |
| txDiscarded Packets | Discarded packets transmitted by the AU. |
| txError Packets | Erroneous packets transmitted by the AU. |

The following table lists the statistics counters for the physical and IP interfaces:

**Table 4-63: Statistics Counters for the IP Interfaces**

| Statistics Counter | Indicates the number of... |
|---|---|
| rxBytes | Bytes received by an IP interface. |
| rxUnicast Packets | Unicast packets received by an IP interface. |
| rxDiscarded Packets | Discarded packets received by an IP interface. |
| rxError Packets | Error packets received by an IPinterface. |
| txBytes | Bytes transmitted by an IP interface. |
| txUnicast Packets | Unicast packets transmitted by an IP interface. |

Run the following command to display the statistics for physical and IP interfaces:

**npu# show interfaces** [{[<interface-type> <interface-id>] | **internal-mgmt** | **external-mgmt** | **bearer** | **local-mgmt**}] **counters**

The following table lists parameters to be used with respect to the type of interface:

**Table 4-64: Parameters for Displaying Statistics for All Physical, IP, and Virtual Interfaces**

| Interface | Parameters | Example |
|---|---|---|

**Table 4-64: Parameters for Displaying Statistics for All Physical, IP, and Virtual Interfaces**

| | | |
|---|---|---|
| Physical Interfaces | **Fast Ethernet:**<br>`<interface-type>`<br>`<interface-id>` | `npu(config)# show interfaces fastethernet 0/1 counters`<br>`npu(config)# show interfaces fastethernet 0/2 counters`<br>`npu(config)# show interfaces fastethernet 0/3 counters`<br>`npu(config)# show interfaces fastethernet 0/4 counters`<br>`npu(config)# show interfaces fastethernet 0/5 counters`<br>`npu(config)# show interfaces fastethernet 0/6 counters`<br>`npu(config)# show interfaces fastethernet 0/7 counters` |
| | **Gigabit Ethernet**<br>`<interface-type>`<br>`<interface-id>` | `npu(config)# show interfaces gigabitethernet 0/8 counters`<br>`npu(config)# show interfaces gigabitethernet 0/9 counters`<br>`npu(config)# show interfaces gigabitethernet 0/10 counters` |
| IP Interfaces | `internal-mgmt` | `npu(config)# show interfaces internal-mgmt counters` |
| | `external-mgmt` | `npu(config)# show interfaces external-mgmt counters` |
| | `bearer` | `npu(config)# show interfaces bearer counters` |
| | `local-mgmt` | `npu(config)# show interfaces local-mgmt counters` |

**IMPORTANT**

An error may occur if:

- The interface type or interface ID you have specified is incorrect. Refer the syntax description for more information about the appropriate values for configuring these parameters.
- The IP interface does not exist for the configured connectivity and boot mode.

**Command Syntax**

**`npu# show interfaces`** `[{[<interface-type> <interface-id>] |` **`internal-mgmt`** `|` **`external-mgmt`** `|` **`bearer`** `|` **`local-mgmt`**`}]` **`counters`**

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[{[<interface-type> <interface-id>] \| internal-mgmt \| external-mgmt \| bearer \| local-mgmt}] counters` | Indicates the type of interface (physical or IP) for which statistics are to be displayed. Do not specify any value for this parameter if you want to display statistics for all physical and IP interfaces. | Optional | N/A | Refer Table 4-64 |

**Display Format (Fast Ethernet/Gigabit Ethernet)**

```
Port                        = <value>
rxUnicast Packets           = <value>
rxMulticast Packets         = <value>
rxBroadcast Packets         = <value>
rxDiscarded Packets         = <value>
rxError Packets             = <value>
rxUnknown Packets           = <value>
txBytes                     = <value>
txUnicast Packets           = <value>
txBroadcast Packets         = <value>
txMulticast Packets         = <value>
txDiscarded Packets         = <value>
txError Packets             = <value>
```

**Display Format (IP Interfaces)**

```
Port                        = <IP Interface Name>
rxBytes                     = <value>
rxUnicast Packets           = <value>
rxDiscarded Packets         = <value>
rxError Packets             = <value>
txBytes                     = <value>
txUnicast Packets           = <value>
```

**Command Modes**

Global command mode

## 4.9.3 Displaying System Files

The following system files reside in the TFTP boot directory of the NPU:

- Performance data files: Contain performance counters for system modules. (For more information about the modules for which you can configure collection and storage of performance data, refer Section 4.3.12. These files are available in the path, /tftpboot/management/performance.
- System log: Contain log and trace messages. (For more information about configuring logging and tracing, refer Section 4.10.1 and Section 4.3.11. These files are available in the path, /tftpboot/management/system_log.
- Active alarms: Contain a list of currently active alarms. These files are residing in the path, /tftpboot/management/fault.
- User history files: Contain information about the commands/tasks executed by the user. These files are available in the path, /tftpboot/management/user_log.

To display a list of performance data, system log, active alarms, or user history files, run the following command:

**npu# show saved {Performance | Active-alarm | Log | User-history} files [recent <1-65535>]**

For example, if you want to view the 30 most recently saved log files, residing in the TFTP boot directory of the NPU, run the following command:

**npu# show saved Log files recent 30**

**Command Syntax**

```
npu# show saved {Performance | Active-alarm | Log | User-history}
files [recent <1-65535>]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `Performance\|Active-alarm\|Log\|User-history` | Indicates the type of system files that are to be displayed: | Mandatory | N/A | ■ Performance<br>■ Active-alarm<br>■ Log<br>■ User-history |
| `[recent <1-65535>]` | Indicates the number of files to be displayed. The most recently saved files are displayed.<br>If you do not specify a value for this parameter, all the files of a particular type are displayed. | Optional | N/A | 1-65355 |

**Command Modes**

Global command mode

# 4.10 Troubleshooting

## 4.10.1 Configuring Tracing

The system can generate traces to be used for tracing the execution sequence of a module and determining the actual cause of an erroneous condition. Traces are recorded for events that occur with respect to the following system modules:

- System startup procedures: Refers to all procedures/events that occur during system startup.
- NPU/AU upgrade procedures: Refers to all the procedures executed while upgrading the NPU/AU.
- Fault management procedures: Refers to internal processes that are executed for monitoring erroneous conditions or fault conditions.
- System performance procedures: Refers to internal processes that are executed for monitoring system performance.
- Shelf management procedures: Refers to internal processes that are executed for monitoring the health and temperature of all hardware components (other than the NPU) such as the AU, PIU and PSU.
- WiMAX signaling protocols: Refers to all the protocols that implement the ASN-GW functionality.
- User interface: Refers to the command line or remote management interface used for executing all user-initiated events such as system shut down or reset.
- AU Manager: Refers to all internal processes used for fault, configuration, and performance management for AU.

The system stores a maximum of 1000 trace and log messages, after which the oldest messages are overwritten. First configure system-level tracing, and then configure tracing separately for each module. This section describes the commands to be used for:

- "Managing System-level Tracing" on page 801
- "Configuring Module-level Tracing" on page 804

### 4.10.1.1 Managing System-level Tracing

System-level tracing refers all the procedures to be executed for managing tracing for the entire system. To manage system-level tracing:

- Enable/disable logging for the entire system and specify the destination (file or console) where traces are to be maintained.
- Make periodic backups of trace files

You can, at any time, view the current destination to where traces are maintained. After you have enabled/disabled system-level logging and specified the destination for storing log messages, you can configure logging separately for each module.

This section describes the commands to be used for:


- "Enabling System-level Tracing" on page 801
- "Disabling System-level Tracing" on page 802
- "Displaying the Current Status of Trace Destinations" on page 803


#### 4.10.1.1.1 Enabling System-level Tracing

You can enable traces for all modules across the system and specify the destination where traces should be written. The destination can be either a file stored on the local system or console. To view whether tracing to file or console is enabled or disabled, refer Section 4.10.1.1.3.

**NOTE**

By default, system-level tracing to file is disabled. If you enable tracing to file, traces are written to the same file that contains log messages. This file is not maintained after system reset. It is recommended that you periodically make a backup of this file on the NPU flash. For details, refer to Section 4.3.11.1.5.

To enable system-level tracing, run the following command:

```
npu(config)# trace destination {file|console}
```

The system maintains a maximum of 1000 trace and log messages, after which the oldest messages are overwritten.

**NOTE**

After you have enabled system-level tracing, you can configure the types of traces (brief or detailed) to be generated for each module. By default, module-level tracing is disabled. To configure tracing for each module, refer to Section 4.10.1.2.

**IMPORTANT**

An error may occur if:

- Tracing is already enabled for the requested destination (file or console).
- An internal error has occurred.

**Command Syntax**

```
npu(config)# trace destination {file|console}
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {file\|console} | Indicates whether tracing to a file or console is to be enabled for the entire system. | Mandatory | N/A | ■ **file**: Indicates that system-level traces are to be written to a file.<br>■ **console**: Indicates that the system-level traces are to be written to a console. |

**Command Modes**

Global configuration mode

### 4.10.1.1.2 Disabling System-level Tracing

To disable tracing at the system-level, run the following command:

```
npu(config)# no trace destination {file|console}
```

**IMPORTANT**

An error may occur if:

- Tracing is already disabled for the requested destination (file or console).
- An internal error has occurred.

**Command Syntax**

```
npu(config)# no trace destination {file|console}
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| {file\|console} | Indicates whether tracing to file or console is to be disabled for the entire system. | Mandatory | N/A | ■ **file**: Indicates that tracing to file is to be disabled.<br>■ **console**: Indicates that tracing to console is to be disabled. |

**Command Modes**

Global configuration mode

### 4.10.1.1.3 Displaying the Current Status of Trace Destinations

To view the current status of trace destinations, that is, whether the system is enabled/disabled for tracing to file or console, run the following command:

```
npu(config)# show trace destination
```

**IMPORTANT**

This command may not be successfully executed if an internal error occurs while processing the result.

| | |
|---|---|
| **Command Syntax** | **`npu(config)# show trace destination`** |
| **Privilege Level** | 1 |
| **Display Format** | `Tracefile(<file name>)  :  Enabled/Disabled`<br>`Console(<console>)  :  Enabled/Disabled` |
| **Command Modes** | Global command mode |

### 4.10.1.2 Configuring Module-level Tracing

After configuring module-level tracing, you can specify whether brief or detailed traces should be recorded for the following modules:

- System startup procedures
- NPU/AU upgrade procedures
- Fault management procedures
- System performance procedures
- Shelf Management procedures
- WiMAX signaling protocols
- User interface
- AU Management procedures

You can also disable tracing for a particular module. This section describes the commands to be used for:

- "Configuring Trace Levels" on page 805
- "Disabling Module-level Tracing" on page 806
- "Displaying Trace Levels" on page 807


**NOTE**

By default, module-level tracing is disabled.

#### 4.10.1.2.1 Configuring Trace Levels

To specify the trace level (brief or detailed) for each module, run the following command:

```
npu(config)# trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AU
Mgr}] {Brief|Detailed}
```

The parameters in this command correspond to the system modules/procedures listed in the following table:

**Table 4-65: Modules for which Tracing can be Enabled**

| Parameter | Refers to... |
|---|---|
| StartupMgr | System startup procedures |
| SWDownload | Software upgrade procedures |
| FaultMgr | Fault management procedures |
| ShelfMgr | Shelf management procedures |
| SIGASN | WiMAX signaling protocols |
| UserIF | User-initiated procedures |
| AUMgr | Internal processes used for managing AU |
| PerfMgr | Performance management procedures |

Specify the module name if you want to configure the trace level separately for this module. If you do not specify the name of the module, the trace level that you configure in this command is applied to all modules.

For example, run the following command if you want logs to be created for WiMAX signaling protocols when the trace level configured to Detailed:

```
npu(config)# trace level SIGASN Detailed
```

**Command Syntax**

```
npu(config)# trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
{Brief|Detailed}
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[{StartupMgr\|SWDownload\|FaultMgr\|PerfMgr\|ShelfMgr\|SIGASN\|UserIF\|AUMgr}]` | Indicates the name of the module for which the trace level is to be configured. If you do not specify any value for this parameter, the same trace level is applied to all modules. For more information about these parameters, refer Table 4-65. | Optional | N/A | ■ StartupMgr<br>■ SWDownload<br>■ FaultMgr<br>■ PerfMgr<br>■ ShelfMgr<br>■ SIGASN<br>■ UserIF<br>■ AUMgr |
| `{Brief\|Detailed}` | Indicates the trace level to be applied for a particular or all modules. | Mandatory | N/A | ■ Brief<br>■ Detailed |

**Command Modes**

Global configuration mode

### 4.10.1.2.2 Disabling Module-level Tracing

To disable tracing for one or all modules, run the following command:

```
npu(config)# no trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

Specify the module if you want to disable tracing for that module. If you do not specify the name of the module, tracing is disabled for all modules.

For example, run the following command if you want to disable tracing for WiMAX signaling protocols:

```
npu(config)# no trace level SIGASN
```

**Command Syntax**

```
npu(config)# no trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

**Privilege Level**

10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[{StartupMgr\|SWDownload\|FaultMgr\|PerfMgr\|ShelfMgr\|SIGASN\|UserIF\|AUMgr}]` | Indicates the name of the module for which tracing is to be disabled. If you do not specify any value for this parameter, tracing is disabled for all functionalities. For more information about these parameters, refer Table 4-65. | Optional | N/A | ■ StartupMgr<br>■ SWDownload<br>■ FaultMgr<br>■ PerfMgr<br>■ ShelfMgr<br>■ SIGASN<br>■ UserIF<br>■ AUMgr\ |

**Command Modes**

Global configuration mode

### 4.10.1.2.3 Displaying Trace Levels

To view the trace levels configured for one or more modules, run the following command:

```
npu(config)# show trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

Specify the module for which you want to view the configured trace level. If you do not specify the name of the module, the trace levels configured for all modules is displayed.

**Command Syntax**

```
npu(config)# show trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

**Privilege Level**

1

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[{StartupMgr\|SWDownload\|FaultMgr\|PerfMgr\|ShelfMgr\|SIGASN\|UserIF\|AUMgr}]` | Indicates the name of the module for which you want to display the configured trace levels.<br>If you do not specify any value for this parameter, the trace levels for all modules are displayed. For more information about these parameters, refer Table 4-65. | Optional | N/A | ■ StartupMgr<br>■ SWDownload<br>■ FaultMgr<br>■ PerfMgr<br>■ ShelfMgr<br>■ SIGASN<br>■ UserIF<br>■ AUMgr |

**Display Format**

```
Module Name     :   Trace level
<module name>    :   <Trace Level>
```

**Command Modes**

Global command mode

## 4.10.2 Configuring Port Monitoring

The port monitoring feature enables you to mirror all incoming and outgoing traffic on an interface to another interface. You can configure one interface as the destination interface to which traffic from multiple interfaces can be mirrored. This section describes the commands to be executed for enabling/disabling port monitoring for source and destination interfaces or displaying configuration information for a particular interface.

To enable port monitoring, you are required to configure:

- Source interfaces: Refers to the FastEthernet or GigabitEthernet interface for which incoming, outgoing or both types of traffic is to be monitored. You can configure port monitoring for one or more source interfaces.

- Destination interface: Refers to the interface where the packets are sent for analysis.

- Direction of the traffic that is to be monitored

The following table lists the interfaces that can be mirrored, and the port numbers mapping to these interfaces:

**Table 4-66: Interface to Ethernet Port Mapping**

| Ethernet Port | Interface Type | Interface ID |
|---|---|---|
| AU1 | Fast Ethernet | 0/1 |
| AU2 | Fast Ethernet | 0/2 |
| AU3 | Fast Ethernet | 0/3 |
| AU4 | Fast Ethernet | 0/4 |
| AU5 | Fast Ethernet | 0/5 |
| AU6 | Fast Ethernet | 0/6 |
| AU7 | Fast Ethernet | 0/7 |
| MGMT | Gigabit Ethernet | 0/8 |
| CASCD | Gigabit Ethernet | 0/9 |

This section describes the commands to be used for:

- “Enabling the Port Monitoring Session” on page 809

- “Disabling a Port Monitoring Session” on page 812

- “Displaying Configuration Information for Source and Destination Interfaces” on page 814

### 4.10.2.1 Enabling the Port Monitoring Session

The port monitoring session refers to the association of a destination interface with one or more source interfaces. You can monitor incoming, outgoing or both types of traffic that is mirrored from the source interface to the destination interface.

**NOTE**

For the current release, only one monitor session can be set up. This means that only one destination can be configured for one or more source interfaces.

Run the following command to enable port monitoring for a source or destination interface:

```
npu(config)# monitor session { destination interface
<interface-type > <interface-id> | source interface
<interface-type> <interface-id> [{ rx | tx | both }] }
```

For example, to configure the Gigabit Ethernet 0/8 interface as the destination interface, you can run the following command:

```
monitor session destination interface gigabitethernet 0/8
```

You can now run the following commands to mirror incoming traffic for the source interfaces, fast Ethernet 0/1 and Fast Ethernet 0/3:

```
npu(config)# monitor session source interface fastethernet 0/1 rx
```

```
npu(config)# monitor session source interface fastethernet 0/3 rx
```

All incoming and outgoing traffic for the 0/1 and 0/3 interfaces will be mirrored to the 0/8 interface.

**IMPORTANT**

An error may occur if:

- The interface ID of the source or destination port you have specified is invalid. Refer Table 4-66 for the interface ID corresponding to each interface type.
- The port specified as the source interface is already specified as the destination interface for another port or vice versa.

| | |
|---|---|
| **Command Syntax** | **npu(config)# monitor session** { **destination interface <interface-type > <interface-id>** \| **source interface** <interface-type> <interface-id> [{ **rx** \| **tx** \| **both** }] } |
| **Privilege Level** | 10 |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `{destination interface <interface-type > <interface-id> \| source interface <interface-type> <interface-id> }` | Indicates whether port monitoring is to be enabled for a source or destination interface. Specify the interface type and interface ID for the interface to be configured. | Mandatory | N/A | Interface type:<br>■ fastethernet<br>■ gigabitethernet<br>Interface ID:<br>■ 0/1 (for Fast Ethernet AU 1 port)<br>■ 0/2 (for Fast Ethernet AU 2 port)<br>■ 0/3 (for Fast Ethernet AU 3 port)<br>■ 0/4 (for Fast Ethernet AU 4 port)<br>■ 0/5 (for Fast Ethernet AU 5 port)<br>■ 0/6 (for Fast Ethernet AU 6 port)<br>■ 0/7 (for Fast Ethernet AU 7 port)<br>■ 0/8Gigabit Ethernet MGMT port)<br>■ 0/9 (for Gigabit Ethernet CSCD port) |

| | | | | | |
|---|---|---|---|---|---|
| | { **rx** \| **tx** \| **both** } | Indicates whether the incoming, outgoing or both types of traffic is to be mirrored for the source interface. | Optional | Both | ■ rx<br>■ tx<br>■ both |

**Command Modes** Global configuration mode

### 4.10.2.2 Disabling a Port Monitoring Session

You can disable a port monitoring session for a source or destinations interface for which port monitoring is enabled. Run the following command to disable port monitoring for a source or destination interface:

```
npu(config)# no monitor session [{source interface <interface-type>
<interface-id> |destination interface <interface-type > <
interface-id >}]
```

**IMPORTANT**

An error may occur if:

- The interface ID of the source or destination port you have specified is invalid. Refer Table 4-66 for the interface ID corresponding to each interface type.
- Port monitoring is not enabled for the source or destination interface for which you are trying to disable port monitoring.

**Command Syntax**

```
npu(config)# no monitor session [{source interface <interface-type>
<interface-id> |destination interface <interface-type > < interface-id
>}]
```

**Privilege Level** 10

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| `[{source interface <interface-type> <interface-id> \|destination interface <interface-type > < interface-id >}]` | Indicates whether port monitoring is to be disabled for a source or destination interface. Specify the interface type and interface ID for the interface to be configured. | Mandatory | N/A | Interface type:<br>■ fastethernet<br>■ gigabitethernet<br>Interface ID:<br>■ 0/1 (for Fast Ethernet)<br>■ 0/2 (for Fast Ethernet)<br>■ 0/3 (for Fast Ethernet)<br>■ 0/4 (for Fast Ethernet)<br>■ 0/5 (for Fast Ethernet)<br>■ 0/6 (for Fast Ethernet)<br>■ 0/7 (for Fast Ethernet)<br>■ 0/8Gigabit Ethernet)<br>■ 0/9 (for Gigabit Ethernet) |

**Command Modes**

Global configuration mode

### 4.10.2.3 Displaying Configuration Information for Source and Destination Interfaces

To display configuration information for port monitoring, that is, the source and destination interfaces for which this feature is enabled, run the following command:

**npu# show port-monitoring**

**Command Syntax**

**npu# show port-monitoring**

**Privilege Level**

1

**Display Format**

Port Monitoring: enabled

Monitor Port: Gi0/9

| Port | Ingress-Monitoring | Egress-Monitoring |
|---|---|---|
| 0/1 | <status> | <status> |
| 0/2 | <status> | <status> |
| 0/3 | <status> | <status> |
| 0/4 | <status> | <status> |
| 0/5 | <status> | <status> |
| 0/6 | <status> | <status> |
| 0/7 | <status> | <status> |
| Gi0/8 | <status> | <status> |
| Gi0/9 | <status> | <status> |

**Command Modes**

Global configuration mode

# A

# Appendix A - Antenna Configurations

## In this Chapter:


- "Introduction" on page 816
- "Antenna Configurations" on page 817
- "Antenna Down-Tilt Guidelines" on page 820

# A.1 Introduction

The 4Motion Access Units implement four transmit/receive channels and are hardware-capable of supporting adaptive beam-forming and MIMO Matrix B technologies in all possible configurations (only MIMO Matrix B, only beam-forming, both beam-forming and MIMO Matrix B in different zones, and combined beam-forming and MIMO Matrix B). The operation mode is selected via software, giving the maximal flexibility to select the appropriate mode for each scenario and for each user.

The following sections explain the proposed antenna configurations that support the different available diversity scenarios and are prepared for supporting beam-forming and MIMO Matrix B techniques that are not available in the current release.

# A.2 Antenna Configurations

## A.2.1 Second Order Diversity Configurations

For this scenario, it is proposed to use one of the following configurations:

### A.2.1.1 Two-Element Wide Slant (/----10λ----\)

This configuration consists of two dual-slant antennas separated by at least 10 wavelengths, when only one antenna element of each is connected, with different polarizations.

This configuration is ready for upgrade to a four-element wide dual-slant array as described in section A.2.2.1 by connecting the additional two elements.

This configuration is suitable for supporting future MIMO Matrix B techniques.

### A.2.1.2 Two-Element Dual-Slant (X)

This configuration consists of a single dual-slant antenna. This configuration is suitable for supporting future MIMO Matrix B techniques.

## A.2.2 Fourth Order Diversity Configurations

For this scenario, the following configuration is proposed:

### A.2.2.1 Four-Element Wide Dual-Slant ( X--10λ--X )

This configuration consists of two dual-slant antennas separated by at least 10 wavelengths. This configuration is suitable for supporting future MIMO Matrix B techniques.

## A.2.3 Beam-Forming/MIMO Configurations

This section provides guidelines for future antenna diversity configurations supporting beam-forming/MIMO Matrix B techniques (not available in current release).

In the receive direction, it is always recommended to use four receive branches. In the transmit direction, it is recommended to use two transmit branches for MIMO Matrix B configurations, and four transmit branches for beam-forming and beam-forming plus MIMO Matrix B configurations.

### A.2.3.1 Four-Element Wide Double Dual-Slant (//--10λ--\\)

This configuration consists of two pairs of dual-slant antennas separated by at least 10 wavelengths, when only one antenna element of each is connected, with

different polarizations in each side. This configuration is suitable for combined beam-forming plus MIMO Matrix B operation. This configuration also provides second order diversity.

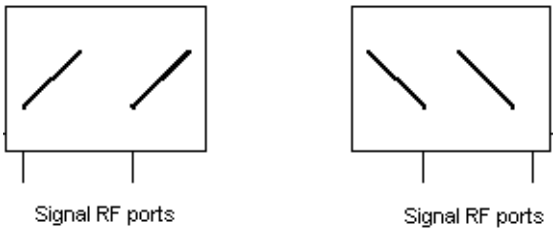



**Figure A-1: Four-Element Wide Double Dual-Slant**

### A.2.3.2 Narrow Double Dual-Slant Array (XX)

A closely spaced dual-slant pair also allows for MIMO Matrix B operation combined with beam-forming, providing second order diversity as well.

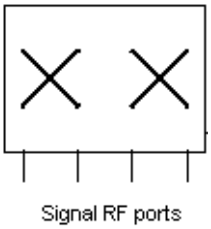



**Figure A-2: Narrow Double Dual-Slant Array**

### A.2.3.3 Wide Double Dual-Slant Array (X--10λ--X)

A widely spaced dual-slant pair allows for MIMO Matrix B operation combined with beam-forming, providing at the same time fourth order diversity. The beam-forming gain in this configuration is lower than in the configurations previously described.

**Figure A-3: Wide Double Dual-Slant Array**

The 4Motion solution can accommodate a wide spectrum of antenna arrays besides the ones described above.

# A.3 Antenna Down-Tilt Guidelines

Antennas may support mechanical down tilt (MDT), electrical down tilt (EDT) and remote electrical tilt (RET). Typical adjustment ranges for MDT and EDT are 0 to -10 degrees.

As a ground rule it is recommended to minimize the usage of MDT, preferring EDT instead.

The degree of tilt to be used is highly dependant on sector configuration and specific environment considerations and conditions. It also depends on network rollout stage - in the initial stage, when not many sites are deployed in a specific area, a certain tilt is be applied to maximize the coverage footprint of the existing sites, and at a later stage, when more sites are built, the degree of tilt per sector may be increased to control the inter-site interference.

Table A-1 shows typical numbers provided only as a reference for initial site deployment.

**Table A-1: Typical EDT Values**

| Environment | EDT (degrees) |
|---|---|
| Dense urban | 6 |
| Urban | 6 |
| Suburban | 4 |
| Rural | 2 |

# B

# Appendix B - Software Upgrade

## In This Appendix:


- "Before You Start" on page 822
- "Upgrading the NPU" on page 823
- "Upgrading the AU" on page 830

# B.1 Before You Start

To load new NPU/AU software files to the unit's flash memory, you are required to execute a simple loading procedure using a TFTP application.

Before performing the upgrade procedure, ensure that you have the most recent instructions, and that the correct software files are available on your computer.

The NPU flash stores two software files that can be used for NPU upgrade, and three software files to be used for AU software upgrade. When you download a new software file to the NPU flash, the oldest file is overwritten with the newly downloaded file.

**NOTE**

To view the current NPU software files, refer to “Displaying the Operational, Shadow, and Running Versions” on page 827.

To view the current AU software files, refer to “Displaying the Shadow, Running, and Operational Versions” on page 837. To delete an existing AU file, refer to “Displaying Images Residing in the AU Flash” on page 842.

# B.2 Upgrading the NPU

To upgrade the NPU, first configure the TFTP server that you want to use for the software version download, and then download the image to the NPU flash. You can then reboot the NPU with the downloaded image. After you have tested and verified that the NPU is functioning properly with the shadow image, you can make the shadow image as the operational image.

**NOTE**

The operational image is the default image used for rebooting the NPU after system reset. The shadow image is the downloaded image that you can use to boot up the NPU. However, the next time the system is reset, it is the operational image that is used to boot up the NPU.

## B.2.1 Executing the Upgrade Procedure

**To execute the upgrade procedure:**

- “Step 1: Configuring the TFTP Server”
- “Step 2: Triggering Software Download”
- “Step 3: Resetting and Booting the NPU Using the Shadow Image”
- “Step 4: Making the Shadow Version Operational”

### B.2.1.1 Step 1: Configuring the TFTP Server

To initiate the NPU software upgrade procedure, start with configuring the TFTP server to be used for the software version download.

To configure the TFTP server, run the following command:

```
npu(config)# software version server <server ip>
```

**IMPORTANT**

An error may occur if you execute this command when another software download is already in progress.

**Command Syntax**

**npu(config)# software version server** *<server ip>*

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <server ip> | Denotes the IP address of the TFTP server to be used for the software version download. | Mandatory | N/A | Valid IP address |

**Command Modes**

Global configuration mode

**NOTE**

After you have configured the TFTP server, you can, at any time, view the TFTP server configuration information. For more details, refer to "Displaying the TFTP Configuration Information" on page 828.

### B.2.1.2 Step 2: Triggering Software Download

After the TFTP server is configured, run the following command to trigger the download of the shadow image to be used for software upgrade:

**npu(config)# load to shadow** <shadow image name>

After you execute this command, the shadow image is downloaded to the NPU flash, and the shadow image that is currently residing in the flash is overwritten.

**IMPORTANT**

An error may occur if you execute this command when:

- Another software download is already in progress.
- The shadow image to be downloaded is already residing in the NPU flash as the shadow or operational image.
- The TFTP server is not configured. For more information about configuring the TFTP server, refer to "Step 1: Configuring the TFTP Server" on page 823.
- The name of the shadow image to be downloaded is incorrect or the format of the file name is incorrect. Because the file to be downloaded is a compressed file, always be suffix the file name with **.tgz**.
- The NPU is running with the shadow image.

**Command Syntax**

```
npu(config)# load to shadow <shadow image name>
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <shadow image name> | Denotes the name of the shadow image that is to be downloaded to the NPU flash. The name of this file should always be suffixed with **.tgz**. | Mandatory | N/A | <Valid shadow image name>.tgz |

**Command Modes**

Global configuration mode

**NOTE**

After you have triggered the download procedure, you can at any time, obtain information about the download status. For more details, refer to "Displaying the Download Status Information" on page 828.

### B.2.1.3 Step 3: Resetting and Booting the NPU Using the Shadow Image

After the shadow image is downloaded to the NPU flash, run the following command to reboot the NPU with the downloaded shadow image:

```
npu(config)# reboot from shadow [<shadow image name>]
```

In the above command, you can specify the shadow image name that is to be used for NPU reboot. If you do not specify a value for the `shadow image name` parameter, the shadow image that was last downloaded is used for rebooting the NPU.

**Command Syntax**

**`npu(config)# reboot from shadow`** `[<shadow image name>]`

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Value |
|---|---|---|---|---|
| `<shadow image name>` | Denotes the name of the shadow image that is to be used for rebooting the NPU.<br>If you do not specify a value for this parameter, the last downloaded shadow image is used for rebooting the NPU. | Optional | N/A | Valid shadow image name |

**Command Modes**

Global configuration mode

### B.2.1.4 Step 4: Making the Shadow Version Operational

After you reset the NPU with the shadow image, and ensure that the NPU is functioning correctly with the shadow image, you can make the shadow version as the operational version. The next time you reset the system, the shadow image that you make operational is used for rebooting the NPU.

To make the shadow version as the operational version, run the following command.

**`npu(config)# switchover npu`**

After you run this command, the operational image is swapped with the shadow image. The next time you reset the NPU, the system boots up with the swapped image.

**IMPORTANT**

If you reset the NPU before running this command, the NPU boots up with the image that is currently the operational image.

**IMPORTANT**

An error may occur if you run this command when the NPU is not running with the shadow image.

**Command Syntax**

```
npu(config)# switchover npu
```

**Command Modes**

Global configuration mode

## B.2.2 Displaying the Operational, Shadow, and Running Versions

You can, at any time (during or after the software download procedure), run the following command to view the operational, shadow, and running versions of the NPU software:

```
npu# show software version npu
```

**NOTE**

The operational version is the default software version that is used for rebooting the NPU after system reset.

The shadow version is the downloaded software version that you can use to boot up the NPU. However, it is the operational software version that is used to boot up the NPU after the next system reset.

The running version is the software version (can be either the operational or shadow version) that is currently running on the system.

**Command Syntax**

```
npu# show software version npu
```

**Display Format**

```
Mananged Object  : NPU
Operational Version : <Operational Version>
Shadow Version      : <Shadow Version>
Running Version     : <Shadow Version>
```

**Command Modes**

Global command mode

## B.2.3 Displaying the TFTP Configuration Information

You can, at any time (during or after the download procedure), run the following command to view the configuration information about the TFTP server that is used for the NPU software upgrade:

```
npu# show software version server
```

**IMPORTANT**

An error may occur if configuration information is requested for a TFTP server that is not configured. For more information about configuring the TFTP server to be used for software download, refer to "Step 1: Configuring the TFTP Server" on page 823.

**Command Syntax**

```
npu# show software version server
```

**Display Format**

```
Software version server <Server IP Address>
```

**Command Modes**

Global command mode

## B.2.4 Displaying the Download Status Information

After initiating software download, you can, at any time, view the download progress for the NPU image. The progress of the image download procedure can be in any of the following stages:

- Downloading
- Decompressing
- Validating
- Copying
- Writing to flash
- Download complete

An error may occur while:

- Downloading the software image from the TFTP server
- Decompressing the downloaded file
- Validating the downloaded file
- Copying of the software image to the NPU flash

Run the following command to view the download status:

**npu# show download status npu**

After you run the above command, the TFTP server address, image name and version, download status, and the number of bytes that have been downloaded, are displayed.

**IMPORTANT**

An error may occur if you execute this command when no download procedure is in progress.

**Command Syntax**

**npu# show download status npu**

**Display Format**

```
Mananged Object            :  NPU
Image Name                 :  <Downloaded Image Name>
Software version server    :  <IP Address of TFTP Server>
Download Status            :  <Download Status>
Download Bytes             :  <Bytes Downloaded>
```

**Command Modes**

Global command mode

# B.3 Upgrading the AU

To upgrade the AU software, first configure the TFTP server that you want to use for software version download, and then download the image to the NPU flash. You can store up to three images to be used for AU upgrade. You are required to create a mapping between the AU slot and the image residing in the NPU flash. Each time the AU is reset or if you are inserting/re-inserting the AU card in the AU slot for, the AU boots up using the AU-to-image mapping that you specify.

You can specify separate AU-to-image mappings for each AU slot. In addition, you are required to create a mapping that is to be used as the default mapping. This default mapping is used for boot up all AU slots for which a mapping does not exist. After you have created the mapping, download the mapped image from the NPU flash to the AU flash (for the AU slot for which the mapping is created). You can then reboot the AU using the downloaded image.

If the image that you have used to reboot the AU is not the image currently mapped to this AU slot, the AU-to-image mapping for that AU slot is updated with this image (provided you have not deleted this image from the NPU flash before rebooting the AU).

**IMPORTANT**

Before inserting an AU card, ensure that an AU-to-image mapping exists, which is to be used for booting the AU. If you insert the AU card when there is no existing mapping, the AU is immediately shut down. For more information about creating a (default) AU-to-image mapping, refer "Step 3: Creating the AU-to-Image Mapping" on page 833.

After you create the AU-to-image mapping, execute the following command (for details refer Section B.3.1.5).

```
npu(config)# reboot au [<au slot-id>] shadow [<shadow image name>]
```

After you execute this comamnd, the AU boots up with the mapped image.

## B.3.1 Procedure for Upgrading the AU

**To execute the AU upgrade procedure:**

- "Step 1: Configuring the TFTP Server" on page 831
- "Step 2: Downloading the AU Image to the NPU Flash" on page 832
- "Step 3: Creating the AU-to-Image Mapping" on page 833

- “Step 4: Downloading the Image to the AU Flash” on page 834
- “Step 5: Resetting and Rebooting the AU with the Shadow Image” on page 835

**IMPORTANT**

If you are inserting/re-inserting the AU card, you are required to execute this procedure before inserting and powering up the AU card. If an error occurs while booting up of the AU, it is reset upto three times, after which it is completely shut down.

### B.3.1.1 Step 1: Configuring the TFTP Server

To create an AU-to-image mapping, you need to first configure the TFTP server to be used for downloading the image to the NPU flash.

**IMPORTANT**

The same TFTP server is used for downloading the software image to be used for upgrading the NPU/AU. For detailed information about the configuring the TFTP server, refer Section B.2.1.1.

Run the following command to configure the TFTP server to be used for software version download.

```
npu(config)# software version server <server ip>
```

**IMPORTANT**

An error may occur if you execute this command when another software download is already in progress.

**Command Syntax**

```
npu(config)# software version server <server ip>
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <server ip> | Denotes the IP address of the TFTP server to be used for the software version download. | Mandatory | N/A | Valid IP address |

**Command Modes**

Global configuration mode

### B.3.1.2 Step 2: Downloading the AU Image to the NPU Flash

After the TFTP server is configured, run the following command to download the AU image (to be used for software upgrade) to the NPU flash:

```
npu(config)# Download AU image <AU image name>
```

**IMPORTANT**

The NPU flash can store a maximum of three AU images. If you download a new AU image to the NPU flash, the oldest image (that is not used for any mapping) is overwritten. To delete an AU image that is used for mapping, you must first delete the AU-to-image mapping. For details, refer to "Deleting the AU-to-Image Mapping" on page 840. It is recommended that you frequently delete AU images that are no longer required, from the NPU flash. For details, refer to "Displaying Images Residing in the AU Flash" on page 842.

After you execute this command, the AU image is downloaded to the NPU flash.

**IMPORTANT**

An error may occur if you execute this command when:

- Another software download is already in progress.
- The AU image to be downloaded is already residing in the NPU flash.
- The TFTP server is not configured. For more information about configuring the TFTP server, refer to "Step 1: Configuring the TFTP Server" on page 831.
- The shadow image name that you have specified does not exist.
- All the AU images residing in the NPU flash are mapped to an AU slot. Any image that is mapped to an AU slot cannot be deleted or overwritten.

**Command Syntax**

```
npu(config)# Download AU image <AU image name>
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Values |
|---|---|---|---|---|
| <AU image name> | Denotes the name of the AU image that is to be downloaded from the TFTP server to the NPU flash. | Mandatory | N/A | Valid image name |

| | |
|---|---|
| **Command Modes** | Global configuration mode |

### B.3.1.3 Step 3: Creating the AU-to-Image Mapping

After you have downloaded the AU image to the NPU flash, you can map this image to a specific AU slot. You can also use this image to create the default AU-to-image mapping.

**IMPORTANT**

If you are inserting/re-inserting the AU card, run this command before inserting and powering up the AU card.

To create an AU slot ID-to-image mapping, run the following command:

```
npu# map au {<au slot-id|default>} <image name>
```

Specify the slot ID if you want to map the image to a specific AU slot. Specify **default** if you want to use this as the default mapping for all AU cards for which a mapping does not exist.

**IMPORTANT**

Always create a default AU-to-image mapping to be used for booting one or more AU cards, before inserting/re-inserting the AU card.

An error may occur if you map the AU to an image that is not residing in the AU flash.

| | |
|---|---|
| **Command Syntax** | `npu# map au {<au slot-id\|default>} <image name>` |

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Value |
|---|---|---|---|---|
| <*au slot-id*\|**default**> | Indicates the AU to which the image is to be mapped. | Mandatory | N/A | ■ 1, 2, 3, 4, 7, 8, 9 (valid slot ID)<br>■ default: if you want to create a default AU-to-image mapping that can be used by all AUs for which a mapping does not exist. |
| <image name> | Denotes the name of the image to be mapped to the AU slot. | Mandatory | N/A | Valid image name |

**Command Modes**

Global configuration mode

### B.3.1.4 Step 4: Downloading the Image to the AU Flash

The AU flash can store two AU images: shadow and operational. The operational image is the image that is currently mapped to the AU slot, and is used for booting the AU when the AU is reset. The shadow image is the image that is downloaded from the NPU flash.

After you have created the AU-to-image mapping for a particular AU slot, download the image from the NPU flash to the AU flash. To download the image to the AU flash, run the following command.

**npu(config)# load to au** [<au slot-id>] **shadow** <shadow image name>

**IMPORTANT**

An error may occur if:

- The AU image is not present in the NPU flash
- You execute this command immediately after inserting the AU card, and it is still registering itself with the 4Motion system.
- An AU image is currently being downloaded to the AU flash.
- The AU software image version is incompatible with the AU hardware.

**Command Syntax**

```
npu(config)# load to au [<au slot-id>] shadow <shadow image name>
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Value |
|---|---|---|---|---|
| `[<au slot-id>]` | Indicates the slot ID of the AU to which the image is to be downloaded from the NPU flash. | Optional | N/A | 1, 2, 3, 4, 7, 8, 9 (Valid slot ID) |
| **shadow** `<shadow image name>` | Denotes the name of the shadow image to be downloaded from the NPU to the AU flash. | Optional | N/A | Valid image name |

**Command Modes**

Global configuration mode

### B.3.1.5 Step 5: Resetting and Rebooting the AU with the Shadow Image

After you have downloaded the image to the AU flash, you can run the following command to reset the system and boot the AU with the shadow image. After you run the following command, the shadow image is used to boot the AU after it is reset.

If the AU is successfully rebooted with the shadow image, then this image becomes the operational image for AU. If an error occurs in booting up the AU with the shadow image, the AU boots up with the operational image instead.

However, the AU is immediately shut down after it boots up with the operational image.

**npu(config)# reboot au** [<au slot-id>] **shadow** [<shadow image name>]

Specify the image name that you have used for creating the mapping in, “Step 3: Creating the AU-to-Image Mapping” on page 833. If you define another image name in this command, the AU-to-image mapping is updated with this image (provided this image is also residing in the NPU flash). Specify the slot ID if you want to reboot a specific AU slot with this image. If you want to reboot all the AU slots with this image, do not specify any slot ID. In addition, the mappings for all AUs are updated with this image.

After you run this command, the software version that is used to reboot the AU is the operational version. This version will be used for rebooting after the next AU reset.

**IMPORTANT**

An error may occur if:

- The AU image is not present in the NPU flash.
- You execute this command immediately after inserting the AU card, and it is still registering itself with the 4Motion system.
- The software image version is incompatible with the hardware.
- Rebooting the AU with the shadow image has failed. (The AU boots up with the operational image, and then initiates self-shut down.

**IMPORTANT**

Do not delete this image from the NPU flash because this image is used to boot up the AU the next timeit is reset . If you delete this image from the NPU flash, the default AU-to-image mapping will be used to reboot the AU.

**Command Syntax**

**npu(config)# reboot au** [<au slot-id>] **shadow** <shadow image name>

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Value |
|---|---|---|---|---|
| `[<au slot-id>]` | Denotes the slot ID of the AU to be rebooted with the image residing in the AU flash.<br>If you do not specify a value for this parameter, the image is used to reboot all AUs. | Optional | N/A | 1, 2, 3 4, 7, 8, 9 |
| `<shadow image name>` | Denotes the name of the AU image to be used for rebooting the AU. If you do not specify the name of the shadow image, the AU reboots with the shadow image residing in the AU flash. | Mandatory | N/A | Valid shadow image name |

**Command Modes**

Global configuration mode

## B.3.2 Displaying the Shadow, Running, and Operational Versions

You can, at any time (during or after the software download procedure), run the following command to view the shadow, running, and operational versions used for the AU:

```
npu# show software version au [<au slot-id>]
```

Specify the AU slot ID, if you want to view the software version for a specific AU slot. Do not specify the AU slot ID if you want to view the software versions used for all AU slots.

**NOTE**

The operational version is the default software version that is used for rebooting the AU after AU reset.

The shadow version is the downloaded software version that you can use to boot the AU. However, the next time the system is reset, it is the operational software version that is used to boot the NPU.

The running version is the software version (is either the operational or shadow version) that is currently running on the system.

**Command Syntax**

```
npu# show software version au [<au slot-id>]
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Value |
|---|---|---|---|---|
| [<au slot-id>] | Indicates the AU slot ID for which information about the shadow, operational, and running images is to be displayed.<br>If you do not specify a value for this parameter, information about the shadow, operational, and running images for all AUs is displayed. | Optional | N/A | 1 , 2 3, 4, 7, 8, 9 |

**Command Modes**

Global configuration mode

**Display Format**

```
Mananged Object     :  AU
AU Slot-ID          :  <au slot-d>
Operational Version :  <oper_ver>
Shadow Version      :  <shaow_ver>
Running Version     : <running_ver>
```

## B.3.3 Displaying the Download Status Information

After initiating software download, you can, at any time, view the download progress for the AU image to the NPU flash. The progress of image download can be in any of the following stages:

- Downloading
- Validating
- Copying

- Writing to flash
- Download complete

An error may occur while:

- Downloading the software image from the TFTP server
- Validating the downloaded file
- Copying of the software image to the NPU flash

Run the following command to view the download status of the AU image to NPU flash:

**npu# show software download status au**

**IMPORTANT**

An error may occur if you execute this command when no download procedure is in progress.

**Command Syntax**

**npu# show software download status au**

**Display Format**

```
Mananged Object          : AU
Image Name               : <Downloaded Image Name>
Software version server  : <Server IP address>
Download Status          : <Download Status>
Download Bytes           : <Download bytes>
```

**Command Modes**

Global configuration mode

## B.3.4 Displaying the AU-to-Image Mapping

You can run the following command to view the AU-to-image mapping for a particular AU slot:

**npu# show au** [{<au slot-id|**default**>}] **mapping**

Specify the AU slot ID to display the AU-to-image mapping for a specific AU slot. If you want to view the default AU-to-image mapping, specify **default**. If you do not specify the slot ID or default, all the AU-to-image mappings are displayed.

**Command Syntax**

```
npu# show au [{<au slot-id|default>}] mapping
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Value |
|---|---|---|---|---|
| <au slot-id\|default> | Indicates the AU for which the AU slot to image mapping is to be displayed.<br>If you do not specify a value for this parameter, all the AU-to-image mappings are displayed. | Mandatory | N/A | ■ 1, 2, 3, 4, 7, 8, 9 (Valid slot ID)<br>■ default: if you want to display the default AU-to-image mapping |

**Command Modes**

Global configuration mode

**Display Format**

```
 AU slot id    Software image
<AU slot-id>   <Image Name>
```

## B.3.5 Deleting the AU-to-Image Mapping

Run the following command to delete an existing AU-to-image mapping:

```
npu# delete au <au slot-id> mapping
```

Specify the AU slot ID for which you want to delete the existing mapping. After you delete this mapping, the AU boots up using the default AU-to-image mapping after the next AU reset.

**Command Syntax**

```
npu# delete au <au slot-id> mapping
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Value |
|---|---|---|---|---|
| `<au slot-id>` | Denotes the slot ID of the AU for which the AU slot to image mapping is to be deleted. | Mandatory | N/A | Valid slot ID |

**Command Modes**

Global command mode

## B.3.6 Deleting AU Images from the NPU Flash

The NPU flash can store a maximum of three AU images. When you download a new AU image to the NPU flash, the oldest image (that is not mapped to any AU) is overwritten. It is recommended that you frequently delete AU images that are no longer required in the NPU flash.

**NOTE**

You cannot delete any image that is already mapped to a particular AU. To delete an image, you are required to first delete the corresponding mapping, and then delete the image from the NPU flash. For more information about deleting an AU-to-image mapping, refer to "Deleting the AU-to-Image Mapping" on page 840.

To delete an AU image from the NPU flash, run the following command:

```
npu# erase au image <au image name>
```

**NOTE**

An error may occur if:

- The image to be deleted is not residing in the NPU flash
- The image is mapped to a particular AU slot.

**Command Syntax**

```
npu# erase au image <au image name>
```

**Syntax Description**

| Parameter | Description | Presence | Default Value | Possible Value |
|---|---|---|---|---|
| `<au image name>` | Denotes the name of the AU image that is to be deleted from the NPU flash. | Mandatory | N/A | Valid image name |

**Command Modes**

Global command mode

## B.3.7 Displaying Images Residing in the AU Flash

To display the images residing in the AU flash, run the following command:

```
npu# show au image repository
```

**Command Syntax**

```
npu# show au image repository
```

**Command Modes**

Global command mode

# Glossary

| | |
|---|---|
| **10Base-T** | An Ethernet cabling standard where data is transmitted in baseband spectrum of a twisted pair cable (i.e. Cat 3 or better, Cat 5 in most networks) with data rate of 10 Mbps. (10 for 10Mbps, Base for baseband, T for twisted pair). 10Base-T implementation uses star topology. |
| **100Base-T** | An Ethernet cabling standard where data is transmitted in baseband spectrum of a twisted pair cable (i.e. Cat 5 or better), with data rate of 100 Mbps. 100Base-T implementation uses star topology. 100Base-T is also known as Fast Ethernet. |
| **1000Base-T** | An Ethernet cabling standard where data is transmitted in baseband spectrum of a twisted pair cable (Cat 5E or better), with data rate of 1000 Mbps. 1000Base-T implementation uses star topology. 1000Base-T is also known as Gigabit Ethernet. |
| **3G** | Third generation wireless service, designed to provide high data speeds, always-on data access, and greater voice capacity.. |
| **AAA** | Authentication, Authorization, and Accounting (pronounced "triple a."). A system (or several systems) that controls what resources users have access to, and keeps track of the activity of users over the network. |
| **AAS** | Adaptive Antenna System, also called Advanced Antenna System, is a technology to enable the network operators to increase the wireless network capacity. In addition, adaptive antenna systems offer the potential of increased spectrum efficiency, extended range of coverage and higher rate of frequency reuse. Adaptive antenna systems consist of multiple antenna elements at the transmitting and/or receiving side of the communication link, whose signals are processed adaptively in order to exploit the spatial dimension of the mobile radio channel. Depending on whether the processing is performed at the transmitter, receiver, or both ends of the communication link, the adaptive antenna technique is defined as multiple-input single-output (MISO), single-input multiple-output (SIMO), or multiple-input multiple-output (MIMO). |
| **ACL** | Access Control List. A filtering mechanism used by many access IP routers that controls which traffic may be received or transmitted on an interface or port. |
| **AISG** | Antenna Interface Standards Group. The objective of the group is to facilitate the introduction of base station antennas with remotely adjustable tilt by agreeing open standards for the associated data transmission system. |
| **ANSI** | American National Standards Institute. A voluntary organization composed of corporate, government, and other members that coordinates standards-related activities, approves U.S. national standards, and develops positions for the United States in international standards organizations. |
| **ARP** | Address Resolution Protocol. Internet protocol used to map an IP address to a MAC address. Defined in RFC 826. |

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| **ARQ** | Automatic Repeat reQuest. A communication technique in which the receiving device detects errors and requests retransmissions. |
| **ASCII** | American Standard Code for Information Interchange. A code for representing English characters as numbers, with each letter assigned a number from 0 to 127. |
| **ASN** | Access Service Network. An ASN is defined as a complete set of network functions needed to provide radio access to a WiMAX subscriber. An ASN is comprised of network elements such as one or more Base Stations (BS) and one or more ASN gateways (ASN-GW). An ASN may be shared by more than one Connectivity Service Network (CSN). |
| **ASN-GW** | Access Service Network Gateway. The ASN-GW is a network entity that acts as a gateway between the ASN and CSN. The ASN functions hosted in an ASN-GW may be viewed as consisting of two groups - the decision point (DP) that provides control functionality and enforcement point (EP) that provides bearer transport. |
| **ASP** | Application Service Provider. A third-party entity that manages and distributes software-based services and solutions to customers across a wide area network from a central data center. |
| **AU** | Access Unit |
| **AVU** | Air Ventilation Unit |
| **AWG** | An electronics industry acronym for American Wire Gauge. AWG is a measure of the thickness of copper, aluminum and other wiring. |
| **AWGN** | Additive White Gaussian Noise. Also known as WGN. Constant spectral energy at all frequencies with a probability histogram that follows a Gaussian bell shaped curve. |
| **BE** | Best Effort. Service supporting applications with no strict rate or delay requirements. |
| **BS** | Base Station. The WiMAX BS is an entity that implements the WiMAX MAC and PHY in compliance with the IEEE 802.16e standard. A BS operates on one frequency assignment, and incorporates scheduler functions for uplink and downlink resources. |
| **BTS** | Base Transceiver Station. A wireless network element that provides the radio interface of the network. The BTS comprises the radio transmission and reception devices, and also manages the signal processing related to the air interface. |
| **BW** | Bandwidth |
| **BWA** | Broadband Wireless Access |
| **CALEA** | The Communications Assistance for Law Enforcement Act is a United States wiretapping law passed in 1994. In its own words, the purpose of CALEA is: To amend title 18, United States Code, to make clear a telecommunications carrier's duty to cooperate in the interception of communications for Law Enforcement purposes, and for other purposes. CALEA was intended to preserve the ability of law enforcement agencies to conduct electronic surveillance by requiring that telecommunications carriers and manufacturers of telecommunications equipment modify and design their equipment, facilities, and services to ensure that they have the necessary surveillance capabilities. |

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| **CDMA** | Code Division Multiple Access is a second generation (2G) cellular technology defined by Qualcomm in IS-95 and IS-2000. A coding scheme, used as a modulation technique, in which multiple channels are independently coded for transmission over a single wideband channel. In some communication systems, CDMA is used as an access method that permits carriers from different stations to use the same transmission equipment by using a wider bandwidth than the individual carriers. On reception, each carrier can be distinguished from the others by means of a specific modulation code, thereby allowing for the reception of signals that were originally overlapping in frequency and time. Thus, several transmissions can occur simultaneously within the same bandwidth, with the mutual interference reduced by the degree of orthogonality of the unique codes used in each transmission. |
| **CE** | The CE-marking is a European Union regulatory community sign. It symbolizes the compliance of the product with all essential requirements relating to safety, public health, consumer protection. |
| **CINR** | Carrier-to-Interference plus Noise Ratio (expressed in dB) |
| **CIR** | Committed Information Rate. The rate (in bits per second) at which a network guarantees to transfer information under normal conditions, averaged over a minimum increment of time. |
| **CLI** | Command Line Interface. A user interface that accepts typed commands to instruct the managed device on the task to perform. |
| **cPCI** | Compact Peripheral Component Interface. a standard for computer backplane architecture and peripheral integration, defined and developed by the peripheral component interconnect (PCI) industrial computers manufacturers group (PICMG). Designed to provide rugged, high-density systems. |
| **CPU** | Central Processing Unit. |
| **CQI** | Channel Quality Information |
| **CS** | Convergence Sublayer. Particular protocols that are responsible for gathering and formatting higher layer information so it can be processed by the lower layers. |
| **CSMA/CD** | Carrier Sense Multiple Access with Collision Detection. Media-access mechanisms wherein devices ready to transmit data first check the channel for a carrier. If no carrier is sensed for a specific period of time, a device can transmit. If two devices transmit at once, a collision occurs and is detected by all colliding devices. This collision subsequently delays retransmissions from those devices for some random length of time. Ethernet and IEEE 802.3 use CSMA/CD access. |
| **CSN** | Connectivity Service Network. A CSN is defined as a set of network functions that provide IP connectivity services to WiMAX subscribers and all the IP core network functions. A CSN is comprised of network elements such as routers, proxy/servers, user databases, and inter-working gateway devices. |
| **CTC** | Convolutional Turbo Code is a type of turbo codes with some of the convolutional schemes used. For its high-performance error correction nature, CTC is the iterative decoding scheme of choice as evidenced by their wide adoption in standards bodies. |
| **DCD** | Downlink Channel Descriptor. |

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| **DHCP** | Dynamic Host Configuration Protocol. A protocol for dynamically assigning IP addresses from a pre-defined list to nodes on a network. Using DHCP to manage IP addresses simplifies client configuration and efficiently utilizes IP addresses. |
| **DL** | Down Link |
| **DSCP** | Differentiated Service Code Point, AKA DiffServ: An alternate use for the ToS byte in IP packets. Six bits of this byte are being reallocated for use as the DSCP field where each DSCP specifies a particular per-hop behavior that is applied to the packet. |
| **DNS** | Domain Naming System. A system that stores information about hostnames and domain names. DNS provides an IP address for each hostname, and lists the e-mail exchange servers accepting e-mail addresses for each domain. |
| **DoS** | Denial of Service |
| **DSL** | Digital Subscriber Line. A technology that exploits unused frequencies on copper telephone lines to transmit traffic typically at multi-megabit speeds. DSL can allow voice and high-speed data to be sent simultaneously over the same line. Because the service is 'always available,' end-users don't need to dial in or wait for call set-up. |
| **EAP** | Extensible Authentication Protocol, A protocol used between a user station and an authenticator or authentication server. It acts as a transport for authentication methods or types. It, in turn may be encapsulated in other protocols, such as 802.1x and RADIUS. EAP is defined by RFC 2284. |
| **EDT** | Electrical Down-Tilt |
| **EIRP** | Equavalent Isotropic Radiated Power. The apparent power transmitted towards the receiver, if it is assumed that the signal is radiated equally in all directions. The EIRP is equal to the power (in dBm) at the antenna port, plus the power gained from the directivity of the antenna (in dBi). |
| **EMC** | Electro-Magnetic Compatibility. The capability of equipment or systems to be used in their intended environment within designed efficiency levels without causing or receiving degradation due to unintentional EMI (Electro Magnetic Interference). EMC generally encompasses all of the electromagnetic disciplines. |
| **EMS** | Element Management System. An element management system (EMS) manages one or more of a specific type of telecommunications network element (NE). Typically, the EMS manages the functions and capabilities within each NE but does not manage the traffic between different NEs in the network. |
| **EN** | Abbreviation for "European Norm". |
| **ERT-VR** | Extended Real-Time Variable Rate. Service supporting real-time applications with variable bit rates that require guaranteed data rate, delay and low jitter, such as voice. |
| **ETS** | European Telecommunications Standard |

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| **ETSI** | European Telecommunications Standards Institute. A non-profit organization producing voluntary telecommunications standards used throughout Europe, some of which have been adopted by the EC as the technical base for Directives or Regulations. |
| **FA** | Foreign Agent. A mobility agent on the foreign network that can assist the mobile node in receiving datagrams delivered to the care-of address. (The foreign network is the network to which the mobile node is attached when it is not attached to its home network, and on which the care-of-address is reachable from the rest of the Internet). See also HA (Home Agent). |
| **FCC** | Federal Communications Commission. A U.S. government agency that supervises, licenses, and controls electronic and electromagnetic transmission standards. |
| **FEC** | Forward Error Correction. A method of communicating data that can corrects errors in transmission on the receiving end. Prior to transmission, the data is put through a predetermined algorithm that adds extra bits specifically for error correction to any character or code block. If the transmission is received in error, the correction bits are used to check and repair the data. |
| **FFT** | Fast Fourier Transform. An algorithm for converting data from the time domain to the frequency domain; often used in signal processing. |
| **FTP** | File Transfer Protocol. A protocol for exchanging files over the Internet. FTP uses the Internet's TCP/IP protocols to enable data transfer. |
| **GMT** | Greenwich Mean Time. On January 1, 1972, GMT was replaced as the international time reference by Coordinated Universal Time (UTC), maintained by an ensemble of atomic clocks around the world. |
| **GPS** | Global Positioning System. A system that uses satellites, receivers and software to allow users to determine their precise geographic position. |
| **GRE** | General Routing Encapsulation. A method or technique of adding an IP standard header and trailer to a message that does not follow IP protocols. The encapsulated message is sent over a public network while received messages are stripped of the wrapper and processed. This permits non-standard data and totally encrypted messages to use the Internet. The technology is an important element in Virtual Private Network (VPN) offerings. |
| **HA** | Home Agent. A node on the home network (the network at which the mobile node seems reachable, to the rest of the Internet, by virtue of its assigned IP address) that effectively causes the mobile node to be reachable at its home address even when the mobile node is not attached to its home network. |
| **HARQ** | Hybrid Automatic Repeat reQuest (Hybrid ARQ) is a sheme wherein information blocks are encoded for partial error correction at receiver and additional, uncorrected errors are retransmitted. |
| **HO** | Hand-Over. |
| **HP** | Abbreviation for "Horizontal Pitch" or standard width measurement which defines the width for plug-in modules in the 19” construction system. One HP equals 5.08 mm. |

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| **IANA** | Internet Assigned Numbers Authority. A regulatory group that maintains all assigned and registered Internet numbers, such as IP and multicast addresses. |
| **ICMP** | Internet Control Message Protocol is a protocol designed to allow hosts to send error and control messages to other network devices. Basically ICMP provides communication between the Internet Protocol (IP) software on network devices. The short ICMP messages use IP packets and are usually processed by the IP software, rather than presented to the user at the application level. |
| **IEC** | The International Electro-Technical Commission. an international organization that writes standards for safety for electrical and other equipment. Many IEC standards were adopted from the German VDE, which was the main historical standards-writing body in Europe. One goal of the IEC is to harmonize differing standards between European countries to facilitate free trade. The U.S. Underwriters Laboratories (UL) and the Canadian CSA are members of the IEC. |
| **IEEE** | Institute of Electrical and Electronics Engineers. IEEE (pronounced I-triple-E) is an organization composed of engineers, scientists, and students. The IEEE is best known for developing standards for the computer and electronics industry. In particular, the IEEE 802 standards for local-area networks are widely followed. |
| **IEEE 802.16** | Also known as WIMAX. A group of broadband wireless communications standards for metropolitan area networks (MANs) developed by a working group of the IEEE. |
| **IEEE 802.16e** | 802.16e, also known as 802.16-2005, is an IEEE standard addressing mobility of wireless broadband (WiMax). IEEE 802.16e is sometimes called Mobile WiMAX, after the WiMAX forum for interoperability. 802.16e, based on an existing WiMAX standard 802.16a, adds WiMAX mobility in the 2-to-6 GHz-licensed bands. 802.16e allows for fixed wireless and mobile Non Line of Sight (NLOS) applications primarily by enhancing the OFDMA (Orthogonal Frequency Division Multiple Access). |
| **IEEE 802.1p** | A QoS method - A three-bit value that can be placed inside an 802.1Q frame tag. |
| **IEEE 802.1q** | The IEEE 802.1q standard defines the operation of VLAN Bridges that permit the definition, operation and administration of Virtual LAN topologies within a Bridged LAN infrastructure. The 802.1q specification establishes a standard method for inserting VLAN membership information into Ethernet frames. A tag field containing VLAN (and/or 802.1p priority) information can be inserted into an Ethernet frame, carrying VLAN membership information. |
| **IEEE 802.3** | A Local Area Network protocol suite commonly known as Ethernet. Ethernet uses Carrier Sense Multiple Access bus with Collision Detection CSMA/CD. This method allows users to share the network cable. However, only one station can use the cable at a time. A variety of physical medium dependent protocols are supported. |
| **IF** | Intermediate Frequency. Radio communications systems modulate a carrier frequency with a baseband signal in order to achieve radio transmission. In many cases, the carrier is not modulated directly. Instead, a lower IF signal is modulated and processed. At a later circuit stage, the IF signal is converted up to the transmission frequency band. |

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| **IGMP** | Internet Group Membership Protocol) is protocol used by IP hosts to report their host group memberships to any immediately neighboring multicast routers.<br><br>The use of IP multicasting in TCP/IP networks is defined as a TCP/IP standard in RFC 1112. In addition to defining address and host extensions for how IP hosts support multicasting, this RFC also defines the IGMP version 1. Version 2 of IGMP is defined in RFC 2236. Both versions of IGMP provide a protocol to exchange and update information about host membership in specific multicast groups. |
| **IP** | Internet Protocol. The standard that defines how data is transmitted over the Internet. IP bundles data, including e-mail, faxes, voice calls and messages, and other types, into "packets", in order to transmit it over public and private networks. |
| **IPv4** | Internet Protocol version 4 is still the most commonly used Internet Protocol (IP) version, initially deployed in 1983. IPv4 addresses are 32-bit numbers often expressed as 4 octets in "dotted decimal" notation (for example, 192.0.32.67). IPv6 is the newer version of the Internet Protocol (deployment began in 1999) that offers many improvements over IPv4, such as 128-bit IP addresses, and will eventualy completely replace IPv4. |
| **ISP** | Internet Service Provider. A company that provides access to the Internet. |
| **KEK** | Key Encryption Key. Key that encrypts or decrypts other key for transmission or storage. |
| **LED** | Light Emitting Diode. |
| **MAC** | Media Access Control. The lower of the two sub-layers of the data link layer defined by the IEEE. The MAC sub-layer handles access to shared media, such as whether token passing or contention will be used. |
| **MAC Address** | Standardized data link layer address that is required for every port or device that connects to a LAN. Other devices in the network use these addresses to locate specific ports in the network and to create and update routing tables and data structures. MAC addresses are 6bytes long and are controlled by the IEEE. |
| **MDT** | Mechanical Down-Tilt |
| **MIB** | Management Information Base. A database of objects that can be monitored by a network management system. SNMP uses standardized MIB formats that allow any SNMP tools to monitor any device defined by a MIB. |
| **MIMO** | Multiple Input, Multiple Output. A technique for faster wireless communication. MIMO allows for the use of multiple transmitter and receiver antennas to increase throughput and range. |
| **MIP** | Mobile IP. A protocol used to provide IP mobility to IPv4-based nodes, defined in RFC-2002. |
| **MIR** | Maximum Information Rate. Specifies the maximum rate of information that can be available to a user. The MIR is used by the traffic policing mechanism to prevent users from sending excess traffic to the network. |

| | |
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| **MTU** | Maximum Transmission Unit. This is the greatest amount of data that can be transferred in one physical frame on the network. If a packet that has a smaller MTU than the packet's frame length is sent, fragmentation will occur. For TCP MTU can range from 68 to 1500 bytes. Larger MTUs provide for lower overhead (fewer headers). |
| **MS** | Mobile Station. The equipment used by the end user to access the WiMAX network. |
| **NAI** | Network Address Identifier. Used to create a new unique subscriber identifier, when a subscriber enters the network without a user name. |
| **NAP** | Network Access Provider. A NAP is a business entity that provides WiMAX radio access infrastructure to one or more Network Service Providers (NSPs). An NAP implements this infrastructure using one or more ASNs. |
| **NAS** | Network Access Server. A Network Access Server operates as a client of RADIUS. The client is responsible for passing user information to designated RADIUS server(s(, and then acting on the response. |
| **NMS** | Network Management System. A system responsible for managing at least part of a network. An NMS is generally a reasonably powerful and well-equipped computer, such as an engineering workstation. NMSs communicate with agents to help keep track of network statistics and resources. |
| **NOC** | Network Operations Center. The physical space from which a typically large telecommunications network is managed, monitored and supervised. |
| **NPU** | Network Processing Unit |
| **NRT-VR** | Non Real Time - Variable Rate. Service supporting non-real-time applications with variable bit rates that require guaranteed data rate and are delay-tolerant such as file transfers |
| **NSP** | Network Service Provider. An NSP is a business entity that provides IP connectivity and WiMAX services to WiMAX subscribers compliant with the established service level agreement. The NSP concept is an extension of the Internet service provider (ISP) concept, providing network services beyond Internet access. To provide these services, an NSP establishes contractual agreements with one or more NAPs. An NSP may also establish roaming agreements with other NSPs and contractual agreements with third-party application providers (e.g. ASP, ISP) for the delivery of WiMAX services to subscribers. From a WiMAX subscriber standpoint, an NSP may be classified as a home or visited NSP. |
| **NWG** | Network Working Group. The WiMAX Forum's Network Working Group (NWG) is responsible for developing the end-to-end network requirements, architecture, and protocols for WiMAX, using IEEE 802.16e-2005 as the air interface. |
| **OA&M** | Operation, Administration & Maintenance. Provides the facilities and the personnel required to manage a network. |
| **OCXO** | Oven-Controlled crystal oscillator often used in navigation system clocks, frequency standards, MTI radars, wireless base stations, telecom timing modules and precision test equipment. |
| **ODU** | Outdoor Unit |

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| **OFDM** | Orthogonal Frequency Division Multiplexing: A method for multiplexing signals, which divides the available bandwidth into a series of frequencies known as tones. Orthogonal tones do not interfere with each other when the peak of one tone corresponds with the null. The rapid switching, frequency-hopping technique is intended to allow more robust data service. |
| **OFDMA** | Orthogonal Frequency Division Multiple Access. It's a logical extension of OFDM and a modulation/multiple access technique. OFDMA divides a signal into sub-channels (i.e. groups of carriers), with each sub-channel (or several sub-channels) being allocated to a different subscriber. |
| **OOB** | Out-Of-Band. Out-of-band management is a method wherein management information exchanged between the network element and its associated management application is carried on a separate communications path from the user data that is coming to/from the network element. Conversely, in-band (IB) management is management data that is carried across the same interface as user data. |
| **OSPF** | Open Shortest Path First. A link-state IGP (Interior gateway protocol) that makes routing decisions based on the shortest-path-first (SPF) algorithm (also referred to as the Dijkstra algorithm). |
| **OSS** | Operations Support Systems. A system that processes telecommunications information supporting various management functions, such as billing, customer care, network management, inventory control, maintenance, trouble ticket reporting, surveillance and service provisioning; not considered a network element or part of the network itself. |
| **PDA** | Personal Digital Assistant. A handheld computing device. |
| **PDU** | Protocol Data Unit. The concept of a PDU is used in the OSI reference model. From the perspective of a protocol layer, a PDU consists of information from the layer above plus the protocol information appended to the data by that layer. . For example, a frame is a PDU of the Data Link Layer, and a packet is a PDU of the Network Layer. |
| **PEP** | Policy Enforcement Point is an entity in a policy-based system where decisions are enacted. |
| **PER** | Packet Error Rate. In a digital transmission, PER is the percentage of packets with errors divided by the total number of packets that have been transmitted, received or processed over a given time period. |
| **PHS** | Payload Header Suppression. PHS is a technique used to mask redundant cell, frame, or packet header information when one or more of the same type of higher layer data PDU's are transported as the payload of an 802.16 MAC PDU. |
| **PHY** | PHYsical Layer. The physical, or lowest, layer of the OSI Network Model. In a wireless network, the PHY defines parameters such as data rates, modulation method, signaling parameters, transmitter/receiver synchronization, etc. Within an actual radio implementation, the PHY corresponds to the radio front end and baseband signal processing sections. |

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| **PICMG** | The PCI Industrial Computers Manufacturer's Group is a consortium of over 450 industrial computer product vendors. PICMG's charter is to develop specifications for PCI-based systems and boards for use in industrial computing applications. PICMG 2.x series is a specification for PCI-based equipment that combines the power of low cost PCI silicon and software with the rugged Eurocard packaging. |
| **PIM** | Protocol Independent Multicast. A protocol-independent multicast routing protocol. PIM sparse mode routes to multicast groups that might span wide-area and interdomain internets. PIM dense mode is a flood-and-prune protocol. |
| **PIU** | Power Interface Unit |
| **PKM** | Privacy Key Management. The key management protocol used in 802.16 to obtain the needed authorization to use the media. PKM protocol operates in two phases: AK (Authorization Key) phase, and TEK (Traffic Encryption Keys). AK represents the secret key used to obtain TEK in the exchanges between MS and BS in subsequent phases. |
| **PSU** | Power Supply Unit |
| **PUSC** | Partial Usage of Sub-Channels |
| **QAM** | Quadrature Amplitude Modulation. A technique used in wireless applications to double the available bandwidth by combining two amplitude-modulated signals. The two combined signals differ in phase by 90 degrees; this technique doubles the bandwidth by combining the two signals at the source before transmission, transmitting digital data at a rate of 4 bits per signal change. |
| **QoS** | Quality of Service. Measure of performance for a transmission system that reflects its transmission quality and service availability. |
| **QPSK** | Quadrature Phase Shift Keying. A data transfer technique used in coaxial cable networks that sends data using modulating signals. Four different phases represent data, with each signal's information determined by the signal before it. For example, if a phase stays the same from one signal to the other, the information has not changed. |
| **RADIUS** | Remote Authentication Dial-In User Service, an authentication and accounting system used by many Internet Service Providers (ISPs). When you connect to the system you must enter your username and password. This information is passed to a RADIUS server, which checks that the information is correct, and then authorizes access to the system. |
| **RET** | Remote Electrical Tilt |
| **RF** | Radio frequency. An AC signal of high enough frequency to be used for wireless communications. |
| **RFC** | Request For Comments. The name of the result and the process for creating a standard on the Internet. New standards are proposed and published on the Internet, as a Request For Comments. The proposal is reviewed by the Internet Engineering Task Force. |
| **RoHS** | Restriction of the use of certain Hazardous Substances in electrical and electronic equipment, reference EC Directive 2002/95/EC of 27 January 2003. |

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| **RS-232** | A serial interface published by the EIA (Electronic Industries Association) for asynchronous data communication over distances up to a few hundred feet. Characterized by a single-ended (not differential) physical layer, it uses one signal wire for transmission, another for reception, and a common wire (ground), plus some timing and control signals. |
| **RS-422** | RS-422 is a serial interface standard in which data is sent in a differential pair (two wires, or twisted pair cable), which allows greater distances and higher data rates than non-differential serial schemes such as RS-232. |
| **RSSI** | Received Signal Strength Indicator. A signal or circuit that indicates the strength of the incoming (received) signal in a receiver. |
| **R&TTE** | Radio & Telecommunications Terminal Equipment. The R&TTE Directive 1999/5/EC governs the marketing and use of R&TTE equipment. With the exception of a few categories of equipment, the Directive covers all equipment, which uses the radio frequency spectrum. It also covers all terminal equipment attached to public telecommunication networks. |
| **RTC** | Real Time Clock. |
| **RTD** | Round Trip Delay. |
| **RTP** | Real Time Protocol. An Internet protocol for transmitting real-time data such as audio and video. RTP itself does not guarantee real-time delivery of data, but it does provide mechanisms for the sending and receiving applications to support streaming data. Typically, RTP runs on top of the UDP protocol, although the specification is general enough to support other transport protocols. |
| **RT-VR** | Real Time - Variable Rate. Service supporting real-time applications with variable bit rates that require guaranteed data rate and delay such as streaming video. |
| **Rx** | Receive |
| **SBS** | Serving Base Station |
| **SDR** | A Software-Defined Radio system is a radio communication system that uses software for the modulation and demodulation of radio signals. |
| **SDU** | Service Data Unit. A set of data that is sent by a user of services of a given layer, and is transmitted to a peer service user semantically unchanged. The SDU is the data that a certain layer will pass to the layer below. |
| **SFA** | Service Flow Authorization. |
| **SFM** | The Service Flow Manager (SFM) located in the BS is responsible for the creation, admission, activation, modification, and deletion of IEEE 802.16e-2005 service flows. It consists of an Admission Control (AC) function, data path function and the associated local resource information. AC decides whether a new service flow can be admitted to the system. |

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| **SNMP** | Simple Network Management Protocol. A network management protocol that provides a means to monitor and control network devices, and to manage configurations, statistics collection, performance, and security. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters. |
| **SSH** | Secure Shell is a protocol for secure remote login and other secure network services over an insecure network. |
| **TBS** | Target Base Station |
| **TCP** | Transmission Control Protocol. Connection-oriented transport layer protocol that provides reliable full-duplex data transmission. TCP is the part of the TCP/IP suite of protocols that is responsible for forming data connections between nodes that are reliable, as opposed to IP, which is connectionless and unreliable. |
| **TCXO** | Temperature-Compensated crystal oscillator often used for frequency control in tactical radios, telecom timing modules (Stratum 3 Type), wireless systems, and reference oscillators. |
| **TDD** | Time Division Duplex is a duplexing technique dividing a radio channel in time to allow downlink operation during part of the frame period and uplink operation in the remainder of the frame period. |
| **TEK** | Traffic Encryption Key - a symmetric key that is used to encrypt/decrypt messages. |
| **TFTP** | Trivial File Transfer Protocol. Simplified version of FTP that allows files to be transferred from one computer to another over a network, usually without the use of client authentication. |
| **ToS** | Type of service. The method of handling traffic using information extracted from the fields in the ToS byte to differentiate packet flows. |
| **Tx** | Transmit |
| **TUV** | TÜV is a safety-testing laboratory with headquarters in Germany. TÜV can test products for compliance with IEC or VDE requirements. Products that have the TÜV insignia have been tested by TÜV for compliance with applicable standards for sale in the European market. |
| **U** | Abbreviation for "Unit" or standard height measurement which defines the vertical height for plug-in modules in the 19” construction system. One U equals 44.5 mm. |
| **UCD** | Uplink Channel Descriptor. |
| **UDP** | User Datagram Protocol. Connectionless transport layer protocol in the TCP/IP protocol stack. UDP is a simple protocol that exchanges datagrams without acknowledgments or guaranteed delivery, requiring that error processing and retransmission be handled by other protocols. UDP is defined in RFC 768. |
| **UGS** | Unsolicited Grant Service. Service supporting real-time applications generating fixed-rate data such as voice over IP without silence suppression. |

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| **UL** | 1. Abbreviation for “Underwriters’ Laboratory”. The UL is an independent organization which conducts safety tests and product certifications.<br><br>2. Up Link |
| **UTC** | Coordinated Universal Time. The reference for the official time used by all countries in the world, maintained by an ensemble of atomic clocks around the world, and it is independent from the time zones. The modern implementation of Greenwich Mean Time. |
| **VLAN** | Virtual Local Area Network. A group of devices on one or more LANs that are configured with the same VLAN ID so that they can communicate as if they were attached to the same wire, when in fact they are located on a number of different LAN segments. Used also to create separation between different user groups. |
| **VoIP** | Voice over Internet Protocol. Provides an advanced digital communications network that bypasses the traditional public switched telephone system and uses the Internet to transmit voice communication. VoIP enables people to use the Internet as the transmission medium for telephone calls by sending voice data in packets using IP rather than by traditional circuit switched transmissions of the PSTN. |
| **WCS** | Wireless Communications Service is defined by the Federal Communications Commission as radio communications that may provide fixed, mobile, radio location, or satellite communication services to individuals and businesses within their assigned spectrum block and geographical area. The WCS is in the 2.3 GHz band from 2,305 to 2,320 MHz and 2,345 to 2,360 MHz.. |
| **WEEE** | Waste Electronic and Electrical Equipment. The purpose of Directive 2002/96/EC on waste electrical and electronic equipment (WEEE) is, as a first priority, the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment. |
| **Wi-Fi** | Wi-Fi (short for wireless fidelity and pronounced 'why-fye') is a term for certain types of wireless local area network that use specifications in the IEEE 802.11 family. The term Wi-Fi was created by an organization called the Wi-Fi Alliance, which oversees tests that certify product interoperability. |
| **WiMAX** | WiMAX is an acronym that stands for Worldwide Interoperability for Microwave Access. WiMAX is a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL. WiMAX provides fixed, nomadic, portable, and mobile wireless broadband connectivity without the need for direct line-of-sight to a base station. |
| **XML** | Extensible Markup Language. Language used for defining a set of markers, called tags, that define the function and hierarchical relationships of the parts of a document or data set. It is a flexible way to create common information formats and share both the format and the data, most commonly on the web. It generally similar to HTML and helps share information in a consistent way. XML is "extensible" because, unlike HTML, the markup symbols are unlimited and self-defining. |